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Contour lines and isotherms based on radiosonde observations at 0300 G.C.T., and winds based on pilot balloon observations at 2200 G.C.T.

CORRECTION

MONTHLY WEATHER REVIEW, March 1947, vol. 75, p. 51: In table of *Provisional Relative Sunspot Numbers for March 1917*, the number opposite the date of March 5, should be 175, instead of the number 165, as printed.

MONTHLY WEATHER REVIEW

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A NOTE ON THE MOVEMENT AND STRUCTURE OF THE FLORIDA HURRICANE OF OCTOBER 1946

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(U. S. Weather Bureau, Washington, D. C.)

INTRODUCTION

The Florida hurricane of October 6–9, 1946, was distinguished by at least three interesting features:

(*a*) A radiosonde flight was made at Tampa in the eye of the hurricane, the second sounding of its kind in the history of upper air observations.[1]

(*b*) An airplane reconnaissance flight was made over the top of the hurricane cloud system, and motion pictures were taken of the cloud formations during flight.

(*c*) The conditions associated with the extremely rapid intensification and equally rapid dissipation of the storm may be regarded as extraordinary.

It is fortunate that a good number of radiosonde and wind observations were obtained from the storm area. These observations have made it possible to construct a more complete picture of the vertical structure of a tropical cyclone than has been possible before. The subject of hurricane structure is not well understood, and many of the concepts which have been advanced are not satisfactorily substantiated by actual observation. The following note attempts to summarize the salient features of the storm, obtained from all available sources of information, as a possible contribution to future studies of hurricane structure.

INCEPTION OF THE STORM

The intertropical convergence zone in the eastern Pacific Ocean moved northward of its average position during the last week of September 1946, at the same time that an intense extratropical cyclone moved eastward across the United States. One line of convergence crossed the Central American coast as far north as Guatemala, and soon became associated with a surface low pressure system which was elongated in an east-west line and centered over Guatemala. This system persisted from October 1–5, though the surface circulation was negligible during much of the period. Meanwhile, the extratropical cyclone moved out into the Atlantic Ocean and was replaced by a large anticyclone covering most of the United States. Associated with its movement was a pronounced quasi-stationary front or shear line extending from Bermuda southwestward across the Caicos Islands through the Windward Passage and Caribbean Sea to Honduras and Guatemala, where it apparently intersected the intertropical convergence line. As the surface cyclone in the Atlantic moved northeastward, an interesting development occurred in the upper troposphere over the Atlantic: a circular cold-core low pressure system appeared at 30,000 feet southwest of Bermuda. It apparently formed in the trailing southerly portion of the trough associated with the northeastward-moving surface cyclone. On October 4, this upper-level low started moving westward, and on October 5, it was located over Georgia and the Carolinas. As it approached the meridian of the tropical surface low in Guatemala, the latter began moving northeastward and intensifying. Throughout this period the anticyclone over the central United States had successfully blocked all cyclonic intrusions from the west.

The circulation in the tropical low did not become systematic until it started northeastward on the afternoon of October 5. As the low advanced into the Caribbean late on that date, traveling at 18–20 m. p. h., it was still weak and its center poorly defined. Between 0130 and 0730 E. S. T., on October 6, however, the movement slackened to about 12 m. p. h., while the central pressure fell from 1,005 mb. to approximately 993 mb. In this 6-hour period, the low became a circular storm with winds of 50 m. p. h., or more. Eight hours later, on the afternoon of October 6, winds of full hurricane force had been measured by both aircraft and surface vessels.

It is difficult to account for the rapid deepening of the storm. Tropical cyclones forming over Central America at this season generally develop more gradually. Winds-aloft reports were available over the region up to 16,000 feet, but these provided no satisfactory means of determining or measuring horizontal divergence patterns over the storm area. Some contribution to the storm's deepening may have been supplied by the operation of the following factors, which were present when the process took place:

(*a*) Prior to the deepening, cyclonic circulation, or strong cyclonic shear, had been established to high elevations over the incipient surface cyclone.[2]

(*b*) The surface low-pressure system moved out over water at the time of maximum normal diurnal convective activity as well as at the time of the large tropical secondary maximum diurnal pressure fall.

(*c*) The isallobaric conditions associated with the incipient storm may have been reinforced by those of the upper-air low pressure system as the latter moved westward from the Atlantic over the southeastern United States.

MOVEMENT AND STEERING PRINCIPLES

The steering principles ordinarily used in forecasting the direction of movement of tropical cyclones were not easily applied in the case of this storm, since both the field

[1] The first sounding in the eye of a hurricane was made at Tampa at 0600 E. S. T., on October 19, 1944.

[2] In an unpublished paper, "Notes for Guidance of Hurricane Forecasters," W. R. Stevens points out that the development of the surface circulation in cyclones forming in the southwestern portion of the Gulf of Mexico is preceded 48 to 72 hours by cyclonic circulation at 5,000 feet or higher.

of motion and the mean temperature conditions associated with warm-tongue steering (1) were in this instance difficult to analyze. The presence north of the hurricane of the cold-core low pressure system aloft, which had moved into the southeastern United States from the Atlantic Ocean, tended to complicate the upper-air analyses. The circulation of both the cold low and the hurricane extended to high elevations, and it was difficult, with only the rawin data from Miami and Havana available near the storm, to determine the appropriate steering level. Studies made subsequent to the storm's occurrence indicate that it moved parallel to the winds circulating around the upper cold low to the north and not parallel to the

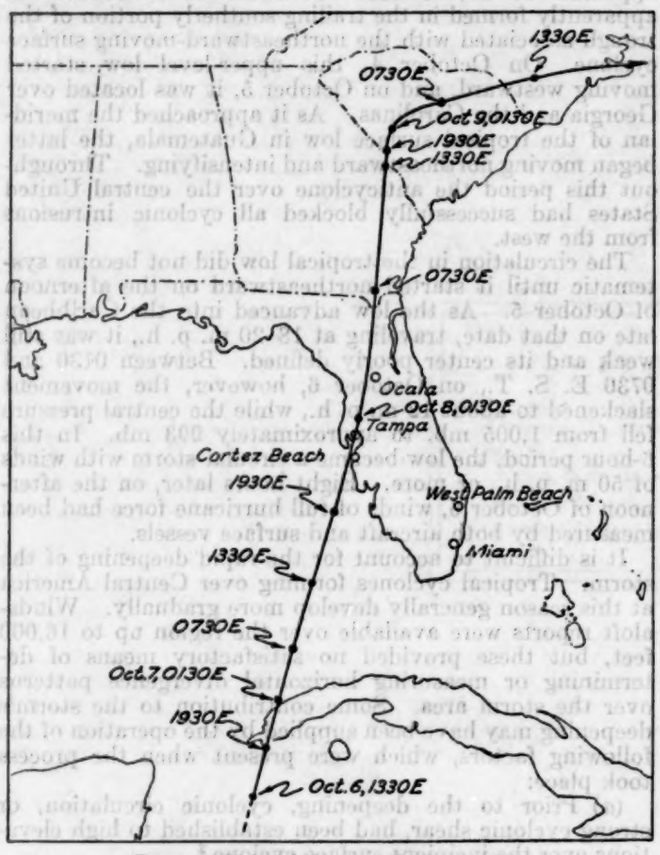

FIGURE 1.—Path of the hurricane, October 6-9, 1946.

axis of the trough extending from this upper low center to the hurricane vortex. Warm-tongue steering patterns were not well defined in the mean temperatures between 700 and 500 mb., because of the initial presence of a tongue of relatively cold air over the southern United States apparently associated with the cold low. This tongue of cold air receded slowly northward along the path of the hurricane. Because of its orientation, the axis of the warm tongue associated with the hurricane could not be located with assurance.

The path of the storm following its development into a major disturbance is shown in Figure 1. The hurricane moved slowly northward at a speed of about 12 m. p. h., until it crossed Cuba. It then began a gradual acceleration to 18 m. p. h., and this speed in turn increased sharply to about 33 m. p. h., when the storm moved inland over Tampa. As it traveled northward into Georgia, a strong high pressure system to the north arrested this rapid motion. It then turned slowly eastward out over the Atlantic. Considering the strong wind movement at all elevations indicated by rawin observations[3] taken at Miami and Havana during its approach and passage, it is puzzling why the storm did not accelerate more rapidly northward before reaching the Florida peninsula. Another apparently anomalous feature of the storm movement is the fact that the greatest filling occurred over water just prior to the greatest acceleration. As the storm passed inland and its speed of movement increased from 18 to 33 m. p. h., the filling stopped abruptly and deepening at a slow rate ensued, as will be discussed later.

STRUCTURE OF THE STORM

A number of regular and special radiosonde releases were made at stations under the influence of this hurricane. One instrument was released at Tampa at 0100 E. S. T., October 8, while that station was in the eye of the storm, and a creditable record was obtained throughout the tropospheric column. This sounding, the other Tampa eye sounding taken during the passage of the similar, though more severe, hurricane of October 1944, and the sounding data obtained from stations in each of the four quadrants of the 1946 storm permitted a more thoroughgoing examination of the thermal structure of hurricanes than had previously been possible.

One means by which the distributions of pressure and temperature in tropical storm vortices may be studied is the pressure anomaly cross section, in which the anomaly is computed from a subtropical standard atmosphere base

[3] Wind observations made by means of radio direction-finding equipment.

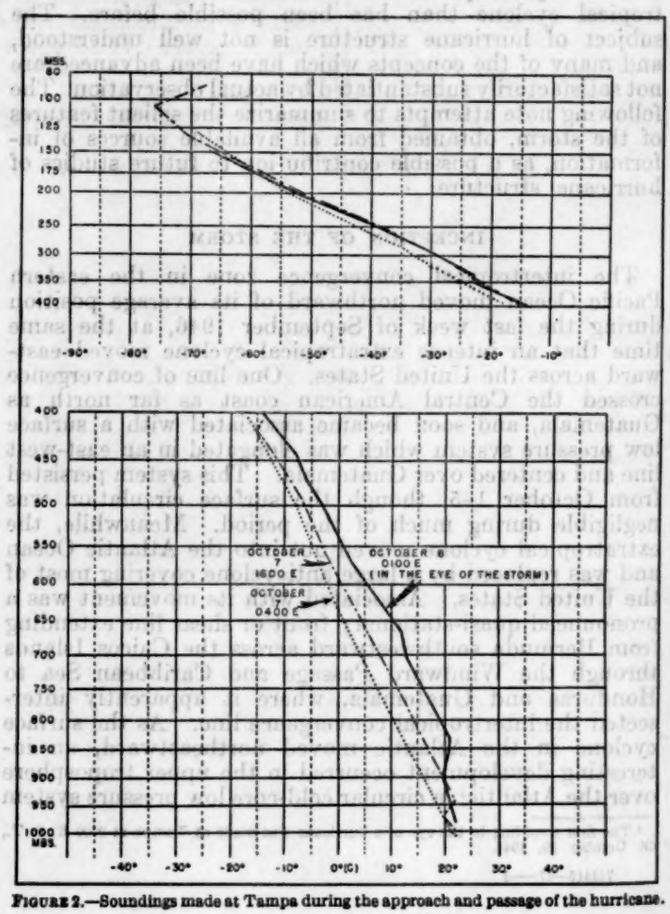

FIGURE 2.—Soundings made at Tampa during the approach and passage of the hurricane.

(2) instead of the U. S. Standard Atmosphere used in connection with altimeter corrections (3). Both space and time cross sections were constructed in the analysis of this 1946 storm. The principal features described below were well marked on each type of cross section, despite the influence of diurnal variations which may have been present in the time cross sections.[4]

Figure 2 contains three soundings made at Tampa during the approach and passage of the hurricane center. The sounding at 0100 E. S. T., was made approximately 30 minutes after the lowest pressure was recorded and while the station was still in the somewhat poorly defined eye of the storm. Figure 3 is a time cross section of pressure anomaly for Tampa during the approach and passage of the storm, while Figure 4 shows the distribution of temperature and relative humidity in time cross section form.

Thermal Structure.—Comparing the soundings shown in Figure 2, it would appear that the core of the storm is

[4] Previous experiences of the author in daily analyses of pressure anomaly cross sections in the tropics have indicated that diurnal variations in the middle and upper troposphere tend to diminish in amplitude over regions of widespread cloudiness.

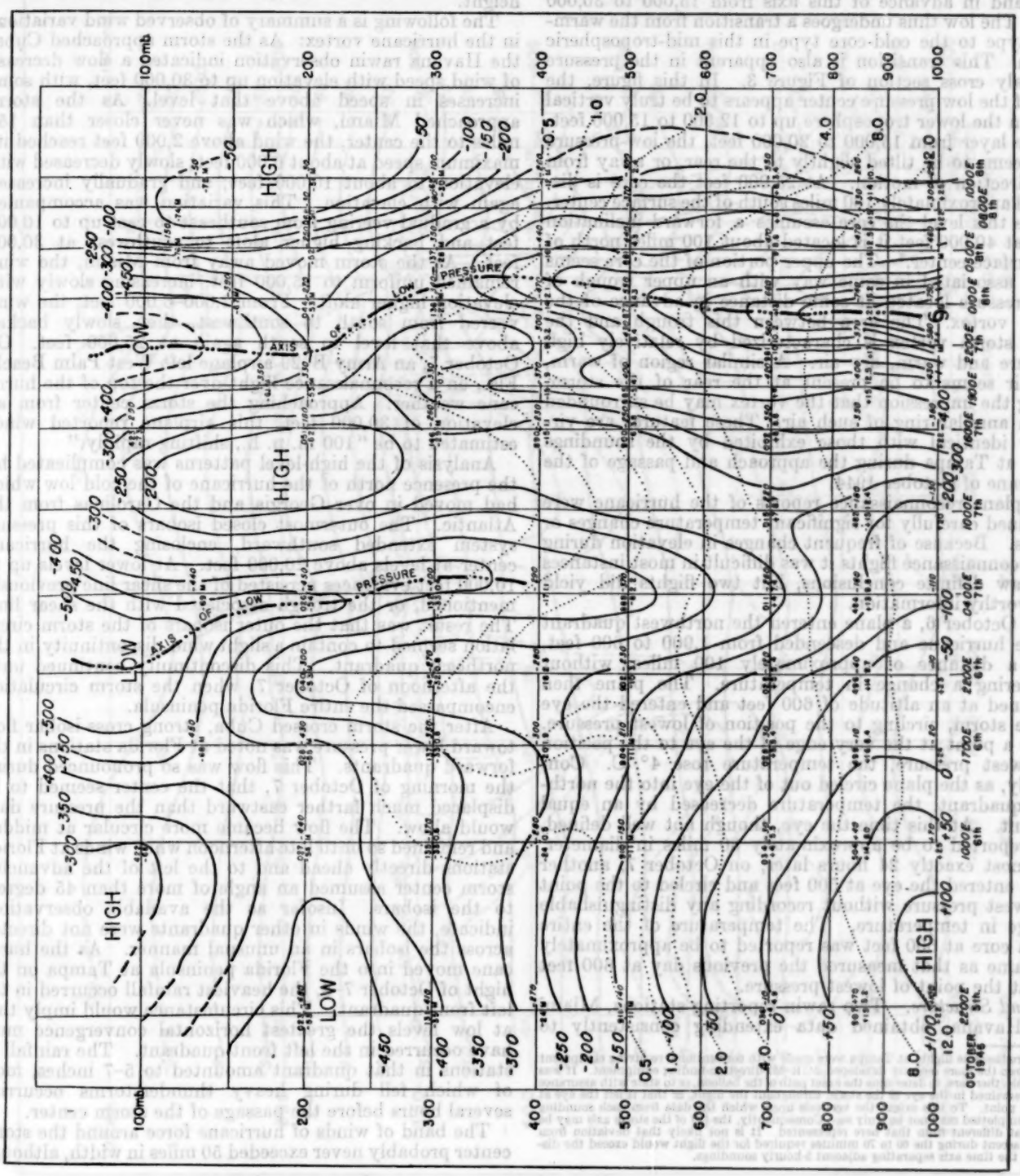

FIGURE 3.—Time cross section of pressure anomaly for Tampa. (Dotted lines, mixing ratio, gm/kgm; heavy dashed lines, extrapolated values of pressure anomaly.)

decidedly warmer at all levels from the surface to approximately 32,000 feet than the air columns at approximately 160 and 340 miles from the center, and slightly colder thereabove. From Figure 4, however, it can be seen that the horizontal temperature gradients represented in Figure 2 by soundings in the eye of the storm and at 9 and 12 hours distant from the eye are not truly representative of temperature gradients immediately adjacent to the eye. The sequence of 3-hourly soundings near the eye indicates that warmest temperatures occur along the axis of lowest pressure from the surface to about 15,000 feet, and in advance of this axis from 15,000 to 30,000 feet. The low thus undergoes a transition from the warm-core type to the cold-core type in this mid-tropospheric region. This transition is also apparent in the pressure anomaly cross section of Figure 3. In this figure, the axis of the low pressure center appears to be truly vertical only in the lower troposphere up to 12,000 to 15,000 feet. In the layer from 15,000 to 20,000 feet, the low-pressure axis seems to be tilted slightly to the rear, or away from the direction of motion. At 25,000 feet the core is displaced approximately 100 miles south of the surface center. Above this level the core assumes a forward inclination until at 40,000 feet it is located about 100 miles north of the surface center.[5] The upper portion of the core seems to be associated in some way with an upper trough of low pressure located at some distance in advance of the storm vortex. The area between this trough and the lower storm vortex is characterized by relatively high pressure and warm, dry air. A similar region of warm, dry air seems to be present at the rear of the storm, giving the impression that the vortex may be surrounded by an annular ring of such air. These features are virtually identical with those exhibited by the soundings made at Tampa during the approach and passage of the hurricane of October 1944.

Airplane reconnaissance reports of the hurricane were examined carefully for significant temperature changes or trends. Because of frequent changes in elevation during the reconnaissance flights it was difficult in most instances to draw definite conclusions, but two flights did yield noteworthy information.

On October 6, a plane entered the northwest quadrant of the hurricane and descended from 1,900 to 600 feet, over a distance of approximately 100 miles, without registering a change in temperature. The plane then remained at an altitude of 600 feet and entered the eye of the storm, circling to the position of lowest pressure. From a point at the very edge of the eye to the position of lowest pressure, the temperature rose 4° C. Conversely, as the plane circled out of the eye into the northeast quadrant, the temperature decreased by an equal amount. At this time the eye, though not well defined, was reported to be approximately 60 miles in diameter.

Almost exactly 24 hours later, on October 7, another plane entered the eye at 500 feet and circled to the point of lowest pressure without recording any distinguishable change in temperature. The temperature of the entire storm core at 500 feet was reported to be approximately the same as that measured the previous day at 600 feet and at the point of lowest pressure.

Wind Structure.—Two rawin reporting stations, Miami and Havana, obtained data extending consistently to high elevations during the progress of this storm. Although several other stations took pilot balloon observations as frequently as possible, these were mostly of short duration because of clouds at low elevations. Considerable wind information was contributed by the reconnaissance airplanes, but because of inconsistencies of wind speeds reported by airplanes reaching the same point in a storm sector within several hours of one another, it was felt that these reports were of greater value in locating the storm center than in determining the variation of wind laterally from the center or the variation with height.

The following is a summary of observed wind variations in the hurricane vortex: As the storm approached Cuba, the Havana rawin observation indicated a slow decrease of wind speed with elevation up to 30,000 feet, with some increases in speed above that level. As the storm approached Miami, which was never closer than 150 miles to the center, the wind above 2,000 feet reached its maximum speed at about 6,000 feet; slowly decreased with elevation to about 10,000 feet; and gradually increased again with elevation. This variation was accompanied by a gradual veering from southeast to east up to 10,000 feet and backing higher aloft to southwest at 30,000 feet. As the storm moved away from Miami, the wind remained uniform to 15,000 feet, increasing slowly with elevation higher aloft. From 2,000–6,000 feet, the wind veered from south to southwest, then slowly backed above that level to south again at 25,000 feet. On October 7, an Army B-29 airplane left West Palm Beach, Fla., on a reconnaissance flight over the top of the hurricane weather. Approaching the storm center from an elevation of 30,000 feet, this airplane reported winds estimated to be "100 m. p. h., shifting rapidly."

Analysis of the high-level patterns was complicated by the presence north of the hurricane of the cold low which had moved in over Georgia and the Carolinas from the Atlantic. The outermost closed isobars of this pressure system extended southward, enclosing the hurricane center at levels above 20,000 feet. At lower levels up to 10,000 feet evidences persisted of the shear line previously mentioned, or the trough associated with the shear line. The result was that the outer isobars of the storm circulation seemed to contain a slight wind discontinuity in the northeast quadrant. This discontinuity continued until the afternoon of October 7, when the storm circulation encompassed the entire Florida peninsula.

After the storm crossed Cuba, strong cross-isobar flow toward lower pressure was noted at Florida stations in the forward quadrants. This flow was so pronounced during the morning of October 7, that the center seemed to be displaced much farther eastward than the pressure data would allow. The flow became more circular at midday and remained so until late afternoon when winds at Florida stations directly ahead and to the left of the advancing storm center assumed an angle of more than 45 degrees to the isobars. Insofar as the available observations indicate, the winds in other quadrants were not directed across the isobars in an unusual manner. As the hurricane moved into the Florida peninsula at Tampa on the night of October 7–8, the heaviest rainfall occurred in the left front quadrant. This circumstance would imply that at low levels the greatest horizontal convergence must have occurred in the left front quadrant. The rainfall at stations in that quadrant amounted to 5–7 inches, most of which fell during heavy thunderstorms occurring several hours before the passage of the storm center.

The band of winds of hurricane force around the storm center probably never exceeded 50 miles in width, although

[5] The radiosonde flights at Tampa were made with conventional receiving equipment rather than the more recently developed SCR-657 direction-finding equipment. It was impossible, therefore, to determine the exact path of the balloon, or to state with assurance that it remained in the eye of the storm throughout the flight, or that it left the eye at any one point. To this extent the verticals upon which the data from each sounding have been plotted may not be truly so. Consequently, the tilt of the storm axis may be somewhat different from that here represented. It is not likely that deviation from vertical ascent during the 60 to 70 minutes required for the flight would exceed the distance of the time axis separating adjacent 3-hourly soundings.

winds of gale force extended outward several hundred miles in the northern semicircle of the storm, and the diameter of the storm circulation ranged up to 750 miles. As the storm moved inland on the Florida coast, a remarkable transition took place near its center. The central area of relative calm became poorly defined and apparently expanded to engulf virtually all of the area previously covered by the hurricane-force winds. There was thus produced a poorly defined and relatively flat center of considerable diameter in which winds increased outward gradually rather than abruptly, reaching gale force at a distance of 75–100 miles from the point of lowest pressure. No station in Florida experienced surface winds in excess of 75 m. p. h.; few reported winds over 60 m. p. h., except in gusts; and the highest wind recorded at Tampa was 47 m. p. h. At the same time, no station seemed to experience the type of calm usually characteristic of the eye of such a storm. Some stations reported winds gradually decreasing from 40–50 m. p. h. down to 15–20 m. p. h. at the time of lowest pressure, then increasing,

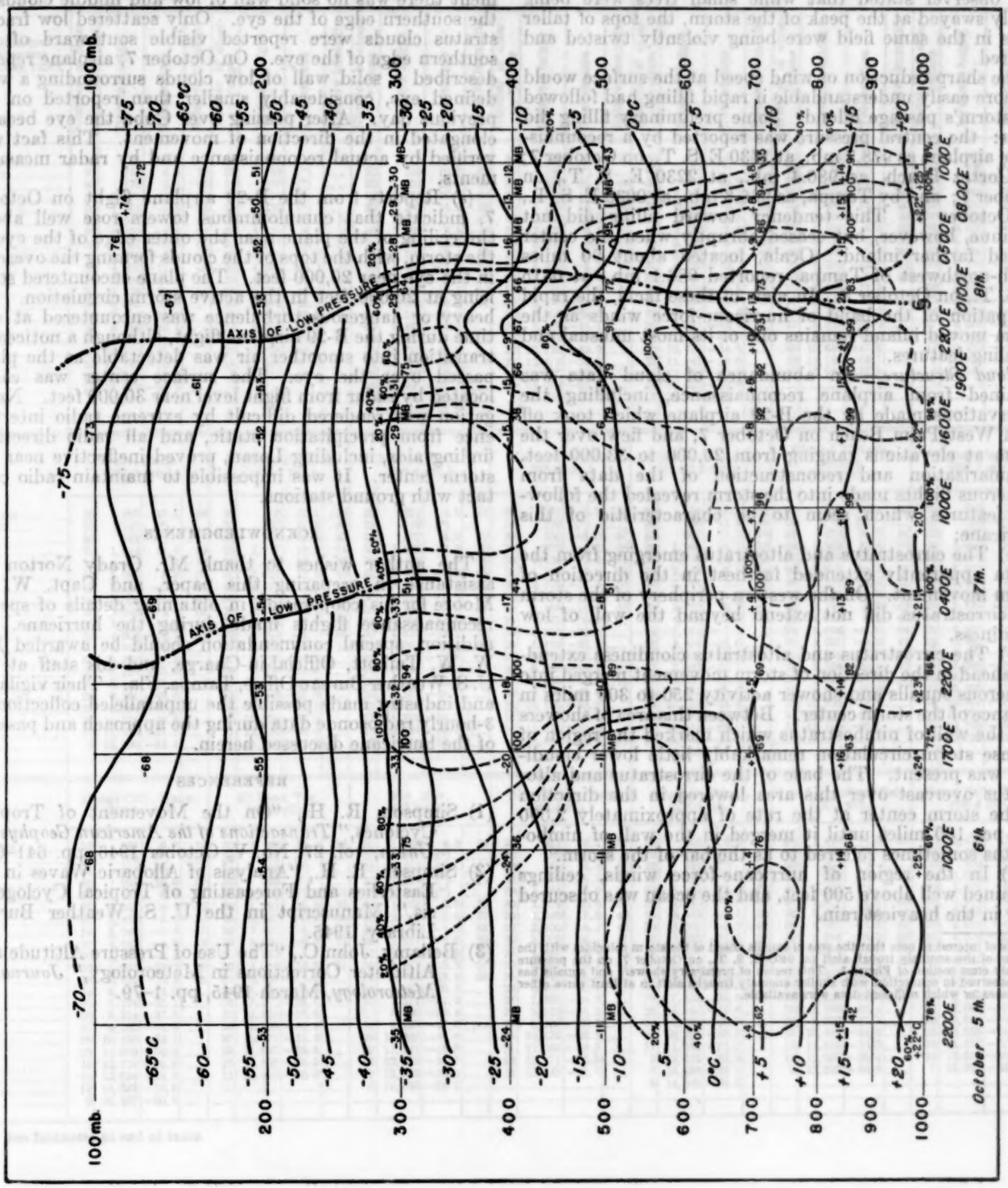

FIGURE 4.—Time cross section showing the distribution of temperature and relative humidity.

without even a relative calm. Other stations reported complete calm for as long as 1 hour, although none reported a rapid transition from near-hurricane-force winds to relative calm. As the storm moved across Florida, surface winds were in general considerably subgradient within 100 miles of the center. A short distance above the surface, however, there seemed to be little disruption of hurricane-force winds near the center. At their times of lowest pressure, several stations reported rapidly moving low clouds, though surface winds were only fresh. One observer stated that while small trees were being gently swayed at the peak of the storm, the tops of taller pines in the same field were being violently twisted and sheared.

The sharp reduction of wind speed at the surface would be more easily understandable if rapid filling had followed the storm's passage inland. Some preliminary filling did occur: the central pressure was reported by a reconnaissance airplane as 978.7 mb., at 1630 E. S. T., on October 7; by Cortez Beach, as 980.4 mb., at 2230 E. S. T., on October 7; and by Tampa, as 986.8 mb., at 0030 E. S. T., on October 8. This tendency toward filling did not continue, however, but ceased abruptly when the center moved farther inland. Ocala, located about 90 miles north-northwest of Tampa, reported 986.1 mb., at 0315 E. S. T., on October 8. In view of these facts, the rapid dissipation of the band of hurricane-force winds as the storm moved inland remains one of its most unusual and puzzling features.

Cloud Structure.—An abundance of cloud data was obtained from airplane reconnaissance, including the observations made by the B-29 airplane which took off from West Palm Beach on October 7, and flew over the storm at elevations ranging from 20,000 to 33,000 feet. Summarization and reconstruction of the data from numerous flights made into the storm revealed the following features which seem to be characteristic of this hurricane:

(*a*) The cirrostratus and altostratus emerging from the storm apparently extended farthest in the direction of storm movement. On the western periphery of the storm the cirrostratus did not extend beyond the wall of low cloudiness.

(*b*) The cirrostratus and altostratus cloudiness extending ahead in the direction of storm movement merged into numerous squalls and shower activity 250 to 300 miles in advance of the storm center. Between this area of showers and the wall of nimbostratus which marked the region of intense storm circulation remarkably little lower cloudiness was present. The base of the cirrostratus and altostratus overcast over this area lowered in the direction of the storm center at the rate of approximately 2,000 feet per 100 miles until it merged in the wall of nimbostratus sometimes referred to as the bar of the storm.[6]

(*c*) In the region of hurricane-force winds, ceilings remained well above 500 feet, and the ocean was obscured only in the heaviest rain.

[6] It is of interest to note that the area of squalls ahead of the storm coincides with the position of the anomaly trough aloft (at 0400 E. S. T., on October 7) on the pressure anomaly cross section of Figure 3. This region of precursory showers and squalls has been observed in connection with similar anomaly troughs aloft in at least three other hurricanes for which sufficient data were available.

(*d*) The eye of the storm was never cloudless, although lower cloudiness was seldom present in sufficient amounts to constitute a ceiling. The wall of clouds surrounding the eye was very nearly vertical, with varying coverages of altostratus and cirrostratus over the top. While the storm was still developing on October 6, the eye was about 60 miles in diameter. Winds did not diminish suddenly as the eye was entered, but gradually fell off from Beaufort force 7 at the outer fringes to force 1 at the point of lowest pressure. At this stage in the storm's development there was no solid wall of low and middle clouds at the southern edge of the eye. Only scattered low fractostratus clouds were reported visible southward of the southern edge of the eye. On October 7, airplane reports described a solid wall of low clouds surrounding a well-defined eye, considerably smaller than reported on the previous day. After passing over Cuba the eye became elongated in the direction of movement. This fact was verified by actual reconnaissance and by radar measurements.

(*e*) Reports from the B-29 airplane flight on October 7, indicate that cumulonimbus towers rose well above the ceiling of the plane near the outer edge of the eye of the storm, with the tops of the clouds forming the overcast in the eye near 20,000 feet. The plane encountered some icing at 20,000 feet in the active storm circulation. No heavy or dangerous turbulence was encountered at any time during the B-29 airplane flight, although a noticeable transition into smoother air was detectable as the plane passed over the eye. The surface center was easily located by radar from flight level near 30,000 feet. Navigation was rendered difficult by extreme radio interference from precipitation static, and all radio direction-finding aids, including Loran, proved ineffective near the storm center. It was impossible to maintain radio contact with ground stations.

ACKNOWLEDGMENTS

The author wishes to thank Mr. Grady Norton for assistance in preparing this paper, and Capt. W. D. Moore for his cooperation in obtaining details of special reconnaissance flights made during the hurricane. In addition, special commendation should be awarded Mr. W. W. Talbott, Official-in-Charge, and his staff at the U. S. Weather Bureau Office, Tampa, Fla. Their vigilance and industry made possible the unparalleled collection of 3-hourly radiosonde data during the approach and passage of the hurricane discussed herein.

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METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR APRIL 1947

AEROLOGICAL OBSERVATIONS

[For description of change in Table 1 and charts, see REVIEW, January 1946, p. 61]

TABLE 1.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during April 1947*

STATIONS AND MEAN SURFACE PRESSURES

Standard pressure surface (mb)	Albany, N. Y. (1,008.6 mb.)				Albuquerque, N. Mex. (834.0 mb.)				Apalachicola, Fla. (1,018.0 mb.)				Atlanta, Ga. (983.9 mb.)				Auburn, Calif. (957.9 mb.)				Big Spring, Tex. (924.4 mb.)				Bismarck, N. Dak. (955.2 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	30	86	4.8	73	30	1,620	14.2	24	30	5	19.8	89	30	300	16.3	75	30	801	15.0	57	30	774	16.9	49	30	505	5.1	71
1,000	30	155	4.4	70	30	56	(*)	....	30	159	19.9	82	30	160	(*)	....	30	134	(*)	....	30	94	(*)	....	30	126	(*)	....
950	30	576	3.1	69	30	509	(*)	....	30	602	18.9	67	30	602	16.7	66	30	576	15.6	54	30	540	(*)	....	30	549	(*)	....
900	30	1,009	1.4	69	30	974	(*)	....	30	1,065	16.8	60	30	1,059	14.1	66	30	1,028	12.8	50	30	1,001	16.9	50	30	989	3.5	64
850	30	1,468	−0.3	66	30	1,459	(*)	....	30	1,550	14.2	55	30	1,539	11.2	66	30	1,505	9.2	48	30	1,486	14.4	50	30	1,451	0.6	67
800	30	1,952	−1.3	60	30	1,970	12.5	25	30	2,060	11.7	47	30	2,043	9.0	54	30	2,004	5.5	51	30	1,996	12.0	43	30	1,936	−1.5	62
750	30	2,469	−3.6	63	30	2,510	8.4	28	30	2,599	8.8	42	30	2,579	6.5	46	30	2,533	1.6	50	30	2,536	8.8	37	30	2,450	−4.0	57
700	30	3,007	−5.9	61	30	3,071	3.7	33	30	3,165	5.7	40	30	3,139	3.8	42	30	3,080	−1.7	49	30	3,100	5.0	34	30	2,990	−7.0	59
650	30	3,591	−8.7	60	30	3,669	−1.3	40	30	3,770	2.5	39	30	3,740	0.4	38	30	3,666	−5.8	46	30	3,699	0.8	36	30	3,569	−10.6	60
600	30	4,202	−11.6	58	30	4,299	−6.7	47	30	4,409	−1.3	37	30	4,375	−3.5	36	30	4,286	−10.1	48	30	4,338	−3.7	34	30	4,176	−14.2	59
550	30	4,866	−15.5	53	29	4,970	−12.0	52	30	5,096	−6.1	38	30	5,057	−7.9	37	30	4,953	−14.6	47	30	5,018	−8.6	33	30	4,835	−18.2	59
500	30	5,576	−20.1	56	29	5,691	−17.5	56	30	5,836	−10.7	34	30	5,791	−12.9	44	30	5,665	−19.9	47	29	5,749	−13.8	....	30	5,538	−22.7	....
450	30	6,353	−25.3	....	29	6,474	−23.2	....	30	6,645	−16.0	41	30	6,590	−18.2	43	30	6,444	−25.5	....	28	6,547	−19.6	....	30	6,308	−28.1	....
400	29	7,200	−31.1	....	29	7,324	−29.3	....	30	7,515	−22.0	....	30	7,456	−24.1	....	30	7,282	−31.7	....	27	7,406	−25.2	....	30	7,138	−34.1	....
350	28	8,136	−37.7	....	29	8,264	−35.9	....	29	8,481	−29.3	....	30	8,416	−31.4	....	30	8,211	−38.9	....	27	8,358	−32.9	....	27	8,059	−40.8	....
300	27	9,190	−45.4	....	29	9,318	−42.8	....	29	9,562	−37.8	....	30	9,488	−39.7	....	30	9,250	−47.0	....	25	9,425	−40.2	....	24	9,093	−48.2	....
250	25	10,390	−53.0	....	27	10,524	−50.1	....	28	10,785	−48.0	....	29	10,710	−49.2	....	29	10,435	−54.6	....	23	10,659	−47.6	....	17	10,252	−54.4	....
200	23	11,799	−59.0	....	15	11,942	−55.4	....	26	12,221	−58.4	....	27	12,134	−59.6	....	27	11,842	−59.6	....	18	12,124	−55.7	....	9	11,688	−56.0	....
175	20	12,640	−59.7	....	7	12,818	−59.1	....	26	13,052	−62.4	....	20	12,975	−62.2	....	21	12,680	−60.8	....	13	12,961	−57.6	....	6	12,548	−54.2	....
150	15	13,587	−59.5	....					25	13,998	−65.5	....	14	13,922	−63.5	....	14	13,632	−59.6	....								
125	9	14,764	−58.8	....					15	15,108	−68.2	....	7	15,018	−65.8	....	8	14,741	−58.8	....								
100									7	16,412	−70.9	....																

Standard pressure surface (mb)	Boise, Idaho (915.9 mb.)				Brownsville, Tex. (1,011.7 mb.)				Buffalo, N. Y. (991.4 mb.)				Caribou, Maine (993.6 mb.)				Charleston, S. C. (1,017.9 mb.)				Ciudad Victoria, Mexico (971.3 mb.)				Columbia, Mo. (986.7 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	30	868	10.6	56	30	6	22.1	85	30	221	4.9	74	30	191	−2.2	76	30	14	17.4	86	29	335	26.1	55	30	230	11.5	72
1,000	30	127	(*)	....	30	107	21.3	85	30	149	(*)	....	30	139	(*)	....	30	166	17.9	83	29	77	(*)	....	30	125	(*)	....
950	30	562	(*)	....	30	558	19.5	83	30	572	4.3	69	30	550	−3.0	67	30	607	17.2	74	29	532	24.7	54	30	557	11.0	66
900	30	1,014	11.4	49	30	1,017	18.9	64	30	1,006	2.5	70	30	973	−5.1	68	30	1,066	14.7	70	29	1,002	21.4	56	30	1,005	9.0	67
850	30	1,488	7.8	50	30	1,507	17.4	53	30	1,468	1.0	66	30	1,420	−7.0	71	30	1,548	12.1	68	29	1,495	18.0	62	30	1,477	7.0	70
800	30	1,985	3.9	53	30	2,024	15.6	40	30	1,953	−0.8	63	30	1,892	−8.0	68	30	2,054	9.5	86	29	2,012	14.7	63	30	1,973	4.7	66
750	30	2,504	−0.2	59	30	2,574	13.3	33	30	2,475	−2.9	59	30	2,394	−11.4	63	30	2,591	7.0	45	29	2,561	12.3	38	30	2,504	2.4	60
700	30	3,054	−4.3	62	30	3,145	9.9	27	30	3,011	−5.3	58	30	2,916	−13.7	66	30	3,151	4.2	42	29	3,133	10.0	44	30	3,052	−0.6	62
650	30	3,633	−8.4	62	28	3,760	5.8	26	30	3,597	−8.1	57	30	3,486	−16.0	53	30	3,752	0.7	41	29	3,743	5.9	43	30	3,645	−3.8	48
600	30	4,250	−12.5	55	28	4,405	0.6	33	30	4,208	−11.6	59	29	4,073	−19.0	....	30	4,386	−2.9	36	29	4,395	0.8	43	29	4,269	−7.8	44
550	30	4,908	−16.7	49	27	5,099	−4.7	38	30	4,874	−15.7	60	29	4,720	−22.4	....	29	5,074	−7.1	....	28	5,084	−4.6	44	29	4,943	−12.3	48
500	30	5,618	−21.7	....	27	5,840	−9.3	37	30	5,581	−20.8	64	29	5,410	−26.2	....	28	5,813	−12.0	....	28	5,831	−9.2	41	29	5,662	−17.3	47
450	30	6,391	−27.8	....	27	6,654	−14.9	....	29	6,357	−26.3	....	29	6,172	−30.3	....	27	6,622	−17.2	....	28	6,641	−14.7	42	29	6,451	−22.8	....
400	30	7,223	−33.9	....	25	7,527	−21.3	....	29	7,191	−32.0	....	28	6,996	−35.3	....	27	7,492	−23.1	....	27	7,526	−20.4	42	29	7,298	−28.6	....
350	30	8,144	−41.1	....	25	8,497	−28.7	....	29	8,119	−38.9	....	27	7,907	−40.9	....	27	8,451	−30.4	....	27	8,500	−28.0	....	29	8,241	−35.5	....
300	28	9,181	−48.6	....	25	9,582	−37.0	....	29	9,161	−46.1	....	26	8,950	−46.4	....	26	9,531	−38.7	....	27	9,589	−36.2	....	29	9,297	−42.9	....
250	27	10,354	−55.8	....	25	10,817	−46.3	....	28	10,353	−52.9	....	24	10,156	−50.0	....	26	10,756	−48.8	....	25	10,830	−45.8	....	28	10,507	−50.7	....
200	21	11,771	−59.6	....	24	12,270	−55.0	....	23	11,769	−58.2	....	14	11,629	−51.7	....	25	12,182	−59.6	....	21	12,278	−55.9	....	24	11,920	−57.6	....
175	15	12,579	−57.7	....	17	13,120	−58.6	....	15	12,594	−59.2	....	10	12,476	−50.6	....	21	13,010	−63.1	....	12	13,110	−60.6	....	18	12,760	−59.3	....
150	8	13,490	−53.4	....	11	14,056	−61.0	....	5	13,511	−53.8	....	5	13,492	−51.7	....	16	13,942	−64.3	....					7	13,729	−57.9	....
125																	9	15,045	−65.3	....								

Standard pressure surface (mb)	Dodge City, Kans. (922.7 mb.)				El Paso, Tex. (879.4 mb.)				Ely, Nev. (807.9 mb.)				Fort Worth, Tex. (988.4 mb.)				Glasgow, Mont. (939.0 mb.)				Grand Junction, Colo. (850.2 mb.)				Great Falls, Mont. (886.3 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	30	787	9.8	74	30	1,195	18.4	19	30	1,908	6.2	55	30	211	18.1	67	30	648	6.8	62	30	1,474	11.0	39	30	1,128	7.7	82
1,000	30	109	(*)	....	30	75	(*)	....	30	117	(*)	....	30	109	(*)	....	30	123	(*)	....	30	93	(*)	....	30	117	(*)	....
950	30	545	(*)	....	30	530	(*)	....	30	557	(*)	....	30	551	16.8	65	30	552	(*)	....	30	541	(*)	....	30	554	(*)	....
900	30	993	10.0	67	30	998	(*)	....	30	1,011	(*)	....	30	1,009	14.7	65	30	995	6.1	57	30	998	(*)	....	30	1,006	(*)	....
850	30	1,467	8.7	61	30	1,485	17.2	21	30	1,486	(*)	....	30	1,491	12.9	61	30	1,461	3.0	60	30	1,475	(*)	....	30	1,471	6.0	81
800	30	1,967	6.4	52	30	1,997	13.0	23	30	1,988	6.9	55	30	1,999	10.6	56	30	1,949	0.0	62	30	1,978	7.7	40	30	1,964	2.1	56
750	30	2,498	3.1	50	30	2,537	9.0	24	30	2,519	3.0	57	30	2,540	7.8	48	30	2,463	−3.5	62	30	2,509	3.3	47	30	2,483	−2.0	60
700	30	3,049	−0.2	47	30	3,101	4.3	26	30	3,070	−1.4	63	30	3,100	4.1	45	30	3,005	−7.3	64	30	3,061	−1.4	56	30	3,025	−6.3	63
650	30	3,642	−4.0	45	30	3,699	−0.5	27	30	3,657	−6.0	70	29	3,700	0.1	41	30	3,580	−11.0	64	30	3,646	−6.3	63	30	3,604	−10.6	68
600	30	4,264	−8.5	41	30	4,332	−5.7	30	30	4,278	−10.6	69	28	4,335	−4.4	44	30	4,189	−14.9	62	30	4,266	−11.2	72	30	4,211	−14.7	65
550	30	4,935	−13.2	42	30	5,010	−10.8	31	30	4,942	−15.2	63	28	5,017	−9.1	41	30	4,839	−19.4	62	30	4,929	−16.2	69	30	4,865	−18.9	58
500	30	5,652	−18.3	43	30	5,733	−16.4	....	30	5,655	−19.9	58	28	5,745	−14.6	....	30	5,542	−24.4	....	29	5,635	−21.8	....	30	5,567	−24.1	....
450	30	6,435	−24.0	....	30	6,521	−22.3	....	30	6,432	−25.5	....	28	6,541	−20.4	....	30	6,305	−30.0	....	27	6,417	−27.3	....	30	6,331	−29.9	....
400	29	7,278	−30.1	....	30	7,371	−28.6	....	30	7,272	−31.9	....	27	7,393	−26.8	....	29	7,133	−35.8	....	26	7,246	−33.5	....	30	7,155	−36.1	....
350	28	8,214	−37.1	....	30	8,313	−35.6	....	30	8,200	−39.4	....	27	8,342	−34.2	....	29	8,047	−42.6	....	26	8,169	−40.4	....	30	8,068	−43.1	....
300	27	9,265	−44.6	....	30	9,368	−43.4	....	30	9,237	−47.6	....	27	9,403	−42.1	....	24	9,081	−49.7	....	24	9,207	−47.7	....	29	9,089	−50.3	....
250	26	10,468	−52.1	....	30	10,571	−51.5	....	29	10,421	−54.8	....	25	10,629	−50.2	....	19	10,251	−56.3	....	19	10,402	−54.0	....	28	10,256	−56.4	....
200	19	11,803	−58.4	....	29	11,907	−58.4	....	20	11,849	−58.3	....	21	12,058	−59.3	....	11	11,673	−57.7	....	18	11,819	−58.2	....	23	11,672	−57.4	....
175	19	12,729	−59.3	....	18	12,828	−58.3	....	15	12,659	−56.7	....	18	12,871	−62.3	....	9	12,513	−55.8	....	14	12,659	−58.4	....	14	12,513	−54.5	....
150	18	13,688	−58.5	....	11	13,810	−58.9	....	7	13,632	−55.0	....	10	13,843	−61.7	....	7	13,488	−54.1	....	6	13,622	−56.6	....	7	13,505	−53.7	....
125	17	14,833	−59.6	....					5	14,765	−54.5	....					6	14,650	−54.1	....								
100	9	16,227	−60.8	....																								

See footnotes at end of table.

TABLE 1.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during April 1947*— Continued

Standard pressure surface (mb.)	Greensboro, N. C. (987.5 mb.)				Hatteras, N. C. (1,020.2 mb.)				Havana, Cuba (1,010.8 mb.)				Honolulu, T. H. (1,016.6 mb.)				Huntington, W. Va. (997.6 mb.)				International Falls, Minn. (974.4 mb.)				Joliet, Ill. (994.5 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	30	273	14.0	67	30	3	14.7	88	29	50	24.4	86	28	3	25.4	60	30	172	11.8	73	29	360	1.2	63	30	178	7.3	80
1,000	30	166	(*)	----	30	172	14.6	80	29	145	24.0	85	28	148	23.3	64	30	152	(*)	----	29	149	(*)	----	30	131	(*)	----
950	30	602	13.9	61	30	609	13.6	72	29	597	21.0	81	28	596	19.4	72	30	586	11.8	65	29	565	0.9	58	30	556	6.6	73
900	30	1,054	11.7	62	30	1,060	11.7	69	29	1,051	18.7	65	28	1,056	15.6	79	30	1,033	9.6	66	29	996	−1.8	63	30	996	5.0	72
850	30	1,531	9.4	62	30	1,537	9.9	58	29	1,550	15.6	68	28	1,539	12.5	79	30	1,506	7.0	67	29	1,449	−3.7	58	30	1,462	3.3	64
800	30	2,032	6.7	59	30	2,039	7.7	47	29	2,062	11.9	74	28	2,048	12.5	43	30	2,003	4.8	63	29	1,925	−5.8	55	30	1,952	.8	64
750	30	2,565	4.0	51	30	2,574	5.3	39	29	2,603	8.7	68	28	2,592	10.8	----	30	2,531	1.8	63	29	2,434	−7.9	55	30	2,472	−1.1	60
700	30	3,118	1.4	43	29	3,128	2.6	----	29	3,168	6.2	53	28	3,160	8.1	----	30	3,080	−1.0	54	29	2,963	−10.5	57	29	3,018	−4.0	55
650	30	3,713	−1.8	----	29	3,728	−.4	----	29	3,778	3.6	35	27	3,773	4.8	----	30	3,673	−4.2	47	29	3,534	−13.5	57	29	3,605	−7.1	55
600	30	4,344	−5.5	----	29	4,359	−4.2	----	29	4,420	.3	----	27	4,417	1.1	----	30	4,295	−8.1	48	28	4,134	−17.0	59	28	4,219	−11.0	56
550	30	5,020	−9.7	----	28	5,038	−8.7	----	28	5,114	−3.8	----	26	5,108	−3.2	----	30	4,968	−12.2	48	27	4,784	−21.0	----	28	4,884	−15.0	55
500	30	5,751	−14.7	----	28	5,770	−13.4	----	25	5,859	−8.6	----	24	5,860	−8.1	----	30	5,688	−16.9	48	27	5,479	−25.8	----	28	5,597	−19.7	58
450	30	6,549	−20.3	----	27	6,569	−18.7	----	21	6,677	−13.9	----	23	6,675	−13.9	----	30	6,474	−22.3	----	27	6,241	−30.7	----	28	6,376	−25.0	----
400	30	7,404	−26.2	----	27	7,434	−24.7	----	19	7,559	−20.0	----	20	7,549	−20.7	----	29	7,328	−28.6	----	27	7,063	−36.3	----	28	7,219	−30.9	----
350	30	8,357	−33.1	----	25	8,391	−31.8	----	19	8,533	−28.0	----	17	8,526	−27.8	----	28	8,270	−35.6	----	25	7,987	−42.5	----	27	8,150	−38.0	----
300	29	9,419	−41.2	----	25	9,462	−39.9	----	18	9,621	−36.7	----	16	9,630	−35.7	----	27	9,318	−44.1	----	23	9,021	−49.5	----	27	9,196	−45.2	----
250	27	10,628	−50.8	----	24	10,682	−48.9	----	16	10,861	−46.6	----	16	10,863	−44.8	----	25	10,519	−53.0	----	22	10,194	−55.3	----	23	10,402	−52.1	----
200	25	12,056	−60.8	----	21	12,117	−58.4	----	15	12,308	−57.0	----	16	12,324	−54.2	----	20	11,927	−61.8	----	9	11,611	−54.8	----	21	11,818	−57.7	----
175	20	12,881	−62.9	----	16	12,962	−61.3	----	12	13,152	−62.5	----	16	13,170	−58.6	----	15	12,780	−63.6	----					13	12,619	−56.8	----
150	16	13,821	−63.1	----	5	13,864	−59.7	----	5	14,130	−68.8	----	15	14,125	−63.0	----	12	13,708	−62.4	----					5	13,589	−55.2	----
125	14	14,924	−64.4	----									10	15,232	−65.2	----	7	14,825	−61.8	----								
100	7	16,305	−64.7	----									5	16,565	−66.6	----												

	Lake Charles, La. (1,015.1 mb.)				Lander, Wyo. (827.4 mb.)				Las Vegas, Nev. (945.2 mb.)				Little Rock, Ark. (1,006.0 mb.)				Mazatlan, Mexico (1,009.3 mb.)				Medford, Oreg. (971.2 mb.)				Merida, Mexico (1,009.0 mb.)			
Surface	30	5	19.6	85	30	1,696	4.9	63	30	574	21.3	22	29	79	16.7	70	30	14	22.0	73	30	401	15.0	56	29	27	29.6	55
1,000	30	134	19.4	81	30	117	(*)	----	30	81	(*)	----	29	130	16.9	66	30	95	21.3	67	30	151	(*)	----	29	107	28.7	57
950	30	582	17.4	74	30	555	(*)	----	30	528	(*)	----	29	573	16.0	64	30	545	22.2	30	30	593	14.5	51	29	564	25.8	56
900	30	1,035	15.7	65	30	1,006	(*)	----	30	996	19.0	22	29	1,026	13.8	65	30	1,009	21.3	----	30	1,041	10.8	55	29	1,036	22.4	60
850	30	1,519	13.6	56	30	1,474	(*)	----	30	1,482	14.7	26	29	1,506	11.4	63	30	1,501	18.6	----	30	1,514	6.9	61	29	1,531	18.7	66
800	30	2,028	11.4	50	30	1,970	4.4	57	30	1,990	10.1	31	29	2,011	9.7	51	30	2,018	15.7	----	30	2,009	3.0	65	29	2,049	14.9	69
750	30	2,570	8.5	46	30	2,495	.6	60	30	2,526	5.4	37	29	2,551	7.0	47	30	2,565	12.2	----	30	2,532	−.7	65	29	2,597	11.4	66
700	30	3,132	5.7	35	30	3,042	−3.6	65	30	3,081	.5	44	29	3,109	3.8	44	30	3,136	8.5	----	30	3,076	−4.0	62	29	3,166	8.5	52
650	30	3,738	2.4	29	30	3,624	−8.2	69	30	3,671	−4.1	49	28	3,715	1.0	40	30	3,746	4.3	----	30	3,660	−7.5	52	28	3,783	5.5	40
600	30	4,377	−2.1	29	30	4,239	−12.6	68	30	4,297	−8.7	52	28	4,350	−3.0	35	30	4,389	.0	----	30	4,274	−11.5	52	28	4,427	1.9	32
550	30	5,065	−7.1	34	30	4,898	−16.9	61	30	4,967	−13.4	51	28	5,031	−7.9	----	28	5,080	−5.0	----	30	4,936	−15.9	54	28	5,125	−2.1	----
500	30	5,798	−12.4	----	29	5,612	−22.1	----	30	5,684	−18.6	45	27	5,765	−13.2	----	28	5,822	−10.2	----	29	5,650	−20.7	59	28	5,874	−7.0	----
450	29	6,605	−18.1	----	29	6,382	−27.9	----	30	6,466	−24.3	----	27	6,566	−19.0	----	28	6,631	−15.6	----	29	6,423	−26.0	----	28	6,696	−12.6	----
400	29	7,466	−24.2	----	29	7,213	−34.1	----	30	7,310	−30.6	----	27	7,426	−25.2	----	28	7,505	−21.7	----	29	7,263	−32.1	----	28	7,577	−19.1	----
350	29	8,425	−31.3	----	29	8,133	−41.4	----	30	8,244	−37.9	----	26	8,384	−31.6	----	26	8,474	−29.4	----	29	8,191	−39.3	----	28	8,555	−26.8	----
300	29	9,499	−39.3	----	28	9,165	−48.9	----	30	9,288	−45.8	----	25	9,458	−39.0	----	25	9,557	−37.5	----	28	9,234	−47.0	----	28	9,648	−35.4	----
250	28	10,720	−48.9	----	28	10,341	−56.3	----	29	10,479	−53.5	----	23	10,683	−47.7	----	18	10,819	−46.0	----	26	10,420	−54.8	----	28	10,891	−45.1	----
200	24	12,155	−58.5	----	20	11,747	−58.3	----	25	11,888	−58.3	----	16	12,118	−57.1	----					22	11,833	−60.9	----	22	12,347	−55.9	----
175	19	12,997	−61.4	----	13	12,582	−56.4	----	17	12,712	−57.2	----	7	12,934	−59.3	----					18	12,645	−60.0	----	14	13,183	−61.6	----
150	12	13,930	−63.8	----	11	13,546	−54.7	----	9	13,658	−55.0	----									8	13,551	−55.7	----	5	14,116	−66.6	----
125	7	15,050	−66.7	----																								

	Miami, Fla. (1,018.1 mb.)				Nantucket, Mass. (1,017.9 mb.)				Nashville, Tenn. (995.8 mb.)				New Orleans, La. (1,016.6 mb.)				North Platte, Nebr. (916.2 mb.)				Oakland, Calif. (1,016.9 mb.)				Ogden, Utah (863.3 mb.)			
Surface	30	4	24.0	80	30	14	5.1	90	29	180	15.3	68	30	2	20.4	85	30	849	6.9	74	30	6	14.9	71	30	1,355	9.0	55
1,000	30	161	23.5	80	30	159	5.4	80	29	144	(*)	----	30	144	19.8	83	30	118	(*)	----	30	147	14.0	70	30	117	(*)	----
950	30	610	20.8	79	30	581	5.7	63	29	585	14.6	63	30	589	17.7	82	30	550	(*)	----	30	583	13.0	62	30	558	(*)	----
900	30	1,076	18.3	73	30	1,020	4.3	55	29	1,034	12.0	64	30	1,047	15.6	67	30	995	7.9	64	30	1,032	12.0	47	30	1,011	(*)	----
850	30	1,564	15.7	65	30	1,484	2.9	47	29	1,511	9.5	53	30	1,532	14.2	52	30	1,465	5.8	63	30	1,509	9.5	42	30	1,484	9.0	50
800	30	2,077	13.1	58	30	1,974	1.5	47	29	2,012	7.6	53	30	2,042	11.9	48	30	1,959	3.3	63	30	2,009	6.8	36	30	1,963	5.5	51
750	30	2,620	10.0	51	30	2,493	−.6	49	29	2,547	4.9	50	30	2,584	9.2	46	30	2,489	.3	61	30	2,542	3.3	38	30	2,509	1.2	56
700	30	3,187	7.0	48	30	3,040	−3.3	50	29	3,101	2.0	40	30	3,149	6.0	45	30	3,029	−3.3	56	30	3,091	−.1	36	30	3,058	−3.0	61
650	30	3,798	3.8	42	30	3,626	−6.2	46	29	3,698	−1.4	39	30	3,756	2.7	38	30	3,618	−7.4	55	30	3,683	−3.9	32	30	3,643	−7.4	66
600	30	4,439	.0	----	30	4,241	−9.6	45	29	4,329	−5.3	40	29	4,394	−1.0	33	30	4,230	−11.5	54	30	4,307	−7.9	----	30	4,259	−11.9	68
550	30	5,132	−3.9	----	30	4,914	−13.6	46	29	5,007	−9.6	----	29	5,084	−5.6	34	30	4,899	−16.1	50	30	4,979	−12.4	----	30	4,918	−16.5	67
500	29	5,878	−8.2	----	30	5,630	−18.3	50	29	5,736	−14.5	----	28	5,826	−10.6	38	30	5,603	−21.1	----	30	5,699	−17.4	----	30	5,629	−21.4	----
450	28	6,695	−13.7	----	28	6,414	−23.6	----	29	6,533	−20.1	----	27	6,632	−16.3	----	30	6,383	−26.7	----	30	6,485	−22.8	----	30	6,405	−27.1	----
400	28	7,573	−19.9	----	28	7,259	−29.4	----	28	7,388	−26.3	----	25	7,496	−22.8	----	30	7,212	−33.0	----	30	7,336	−29.0	----	29	7,239	−33.4	----
350	27	8,547	−27.3	----	27	8,197	−36.1	----	27	8,340	−33.3	----	23	8,456	−30.3	----	29	8,144	−39.9	----	30	8,276	−36.1	----	29	8,163	−40.6	----
300	26	9,639	−35.6	----	26	9,257	−43.4	----	26	9,404	−41.0	----	21	9,535	−38.0	----	29	9,179	−47.7	----	29	9,326	−43.8	----	28	9,189	−48.5	----
250	26	10,882	−45.3	----	25	10,466	−51.9	----	23	10,624	−50.1	----	19	10,761	−47.5	----	28	10,364	−54.8	----	23	10,545	−51.1	----	28	10,367	−55.9	----
200	25	12,336	−55.0	----	20	11,913	−58.6	----	19	12,053	−58.9	----	15	14,230	−56.5	----	24	11,767	−57.3	----	18	11,952	−56.6	----	19	11,762	−57.2	----
175	20	13,182	−59.7	----	17	12,733	−59.6	----	17	12,884	−61.0	----	9	13,061	−59.5	----	23	12,606	−56.7	----	12	12,788	−55.5	----	14	12,613	−57.0	----
150	16	14,130	−64.4	----	9	13,655	−56.5	----	13	13,813	−60.7	----					20	13,580	−56.9	----	6	13,730	−55.8	----	11	13,575	−55.6	----
125	10	15,220	−67.5	----					10	14,952	−60.2	----					11	14,735	−56.3	----								

See footnotes at end of table.

TABLE 1.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during April 1947*—Continued

Standard pressure surface (mb.)	Oklahoma City, Okla. (967.0 mb.)				Omaha, Nebr. (978.8 mb.)				Phoenix, Ariz. (971.0 mb.)				Pittsburgh, Pa. (972.9 mb.)				Portland, Maine (1,016.3 mb.)				Rapid City, S. Dak. (901.9 mb.)				St. Paul, Minn. (987.7 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	27	391	14.2	74	30	308	9.1	72	30	339	22.7	27	30	382	9.6	63	30	20	3.4	75	30	980	5.0	71	30	225	5.8	73
1,000	27	106	(*)	----	30	128	(*)	----	30	80	(*)	----	30	151	(*)	----	30	151	3.9	69	30	123	(*)	----	30	122	(*)	----
950	27	540	14.2	70	30	556	7.4	71	30	533	23.4	22	30	586	8.9	63	30	570	2.9	62	30	552	(*)	----	30	543	4.1	70
900	27	995	12.0	69	30	998	5.2	74	30	997	19.6	23	30	1,025	7.2	65	30	1,003	.7	57	30	997	(*)	----	30	980	1.7	74
850	27	1,473	10.4	68	30	1,464	3.8	74	30	1,485	15.3	26	30	1,494	5.4	61	30	1,460	−1.3	59	30	1,463	4.2	65	30	1,439	−.3	67
800	27	1,976	8.7	57	30	1,954	1.5	71	30	1,994	10.8	30	30	1,988	3.3	56	30	1,942	−3.0	53	30	1,954	1.3	69	30	1,923	−2.0	61
750	27	2,511	5.8	49	30	2,479	−.9	65	30	2,532	6.2	34	30	2,515	.7	57	30	2,456	−4.8	51	30	2,472	−2.0	73	30	2,440	−4.1	60
700	27	3,069	2.5	42	30	3,021	−3.6	57	30	3,088	1.4	35	29	3,060	−2.4	58	30	2,992	−7.2	50	30	3,016	−5.2	74	30	2,976	−6.8	59
650	26	3,666	−1.5	35	29	3,607	−6.9	50	30	3,683	−2.7	34	29	3,652	−5.4	57	30	3,573	−10.2	55	30	3,597	−8.6	69	30	3,557	−10.2	58
600	25	4,305	−5.6	32	28	4,225	−10.8	48	29	4,309	−7.1	34	29	4,270	−9.0	55	30	4,180	−13.3	57	30	4,211	−12.4	63	30	4,164	−13.8	61
550	25	4,984	−10.0	----	28	4,890	−15.1	49	29	4,988	−11.8	35	29	4,944	−13.1	56	30	4,841	−16.7	54	30	4,871	−16.7	58	30	4,820	−18.1	59
500	25	5,710	−15.0	----	28	5,602	−20.2	51	29	5,706	−17.0	----	29	5,659	−17.7	55	30	5,548	−21.2	----	30	5,580	−21.5	52	30	5,525	−22.9	----
450	24	6,498	−20.9	----	28	6,381	−25.9	----	29	6,496	−22.7	----	29	6,444	−23.0	----	30	6,326	−26.5	----	30	6,354	−27.0	----	30	6,295	−28.1	----
400	24	7,356	−27.2	----	28	7,217	−32.3	----	29	7,342	−28.8	----	29	7,292	−29.1	----	30	7,159	−32.4	----	30	7,187	−33.2	----	30	7,125	−34.3	----
350	23	8,299	−34.0	----	26	8,145	−39.1	----	29	8,283	−35.8	----	28	8,229	−36.4	----	30	8,087	−39.4	----	30	8,111	−40.3	----	30	8,046	−41.3	----
300	14	9,371	−40.8	----	26	9,185	−46.3	----	28	9,342	−43.7	----	28	9,281	−43.7	----	30	9,125	−46.8	----	29	9,139	−47.7	----	30	9,075	−48.7	----
250	11	10,590	−48.5	----	25	10,379	−52.7	----	26	10,553	−52.2	----	28	10,483	−52.2	----	29	10,314	−53.8	----	25	10,333	−53.9	----	25	10,257	−54.6	----
200	8	12,044	−55.4	----	23	11,799	−56.5	----	20	11,967	−59.4	----	26	11,904	−59.3	----	24	11,753	−58.0	----	10	11,770	−57.2	----	18	11,664	−55.9	----
175	5	12,841	−58.9	----	21	12,649	−56.5	----	12	12,796	−59.3	----	22	12,748	−60.4	----	19	12,616	−58.3	----					11	12,525	−54.5	----
150					13	13,618	−55.7	----	5	13,764	−58.7	----	19	13,713	−59.6	----	12	13,527	−55.6	----					7	13,509	−52.9	----
125					8	14,780	−55.4	----					11	14,852	−60.2	----	8	14,663	−54.2	----								

Standard pressure surface (mb.)	San Antonio, Tex. (984.9 mb.)				San Juan, P. R. (1,016.5 mb.)				Santa Maria, Calif. (1,008.7 mb.)				Sault Ste. Marie, Mich. (989.7 mb.)				Spokane, Wash. (946.0 mb.)				Swan Island, W. I. (1,013.6 mb.)				Tacubaya, Mexico.[1] (..... mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	30	240	19.4	73	30	15	24.7	79	29	71	14.0	71	30	221	−0.2	79	30	598	11.2	58	30	10	26.2	79				
1,000	30	108	(*)	----	30	159	23.5	78	29	144	13.6	72	30	136	(*)	----	30	130	(*)	----	30	130	25.3	80				
950	30	554	18.3	73	30	606	20.1	78	29	581	12.7	64	30	554	−1.2	67	30	565	(*)	----	30	583	21.8	82				
900	30	1,014	17.0	71	30	1,071	16.6	76	29	1,029	12.7	49	30	977	−2.3	61	30	1,013	9.4	50	30	1,048	18.8	78				
850	30	1,500	15.0	65	30	1,556	13.6	72	29	1,508	10.4	46	30	1,430	−3.5	62	30	1,484	5.5	56	30	1,538	16.2	67				
800	30	2,012	13.1	49	30	2,065	11.0	66	29	2,009	7.1	45	30	1,908	−4.9	55	30	1,976	1.5	63	30	2,052	13.3	63				
750	30	2,557	11.0	43	30	2,608	9.2	40	29	2,540	4.1	37	30	2,421	−6.5	52	30	2,495	−2.4	65	30	2,597	10.0	60				
700	30	3,125	7.8	35	30	3,172	7.5	----	29	3,095	1.1	31	30	2,952	−8.7	55	30	3,036	−6.2	65	30	3,164	7.7	45				
650	29	3,729	3.6	26	30	3,781	4.7	----	29	3,692	−2.5	30	30	3,531	−11.6	54	30	3,617	−9.9	60	30	3,778	4.0	26				
600	29	4,373	−1.1	27	29	4,425	1.1	----	29	4,316	−6.5	----	30	4,133	−15.1	50	30	4,224	−13.7	56	30	4,421	1.8	----				
550	28	5,064	−6.0	----	29	5,117	−8.3	----	29	4,995	−10.8	----	30	4,700	−18.9	46	30	4,882	−18.0	52	30	5,121	−1.7	----				
500	28	5,801	−11.6	----	29	5,864	−8.5	----	29	5,716	−15.7	----	28	5,493	−23.7	----	29	5,590	−22.5	----	30	5,870	−6.5	----				
450	28	6,609	−17.3	----	29	6,681	−14.1	----	29	6,510	−21.1	----	27	6,264	−28.9	----	28	6,364	−27.8	----	29	6,606	−11.6	----				
400	26	7,472	−23.2	----	29	7,556	−20.2	----	29	7,360	−27.8	----	26	7,091	−34.4	----	28	7,196	−33.9	----	29	7,577	−17.7	----				
350	25	8,438	−30.2	----	29	8,531	−27.4	----	29	8,304	−35.2	----	26	8,012	−40.9	----	27	8,108	−40.8	----	28	8,561	−25.2	----				
300	21	9,517	−38.0	----	29	9,621	−35.9	----	29	9,361	−42.6	----	23	9,033	−47.8	----	27	9,139	−48.1	----	27	9,660	−33.8	----				
250	18	10,752	−46.6	----	29	10,861	−45.5	----	28	10,581	−50.2	----	22	10,222	−53.2	----	26	10,310	−54.6	----	27	10,912	−43.5	----				
200	16	12,200	−55.4	----	26	12,312	−55.4	----	17	12,025	−58.6	----	14	11,608	−54.3	----	23	11,709	−56.4	----	25	12,378	−54.7	----				
175	15	13,045	−59.0	----	25	13,154	−60.9	----	7	12,856	−61.1	----	9	12,509	−54.0	----	23	12,557	−55.6	----	25	13,219	−60.9	----				
150	7	14,036	−61.5	----	17	14,092	−66.4	----									23	13,542	−53.8	----	17	14,175	−66.8	----				
125					7	15,208	−70.7	----									18	14,694	−53.5	----	9	15,282	−72.4	----				
100																	14	16,117	−53.8	----								

Standard pressure surface (mb.)	Tampa, Fla. (1,017.8 mb.)				Tatoosh Island, Wash. (1,015.2 mb.)				Toledo, Ohio (994.5 mb.)				Washington, D. C. (1,016.6 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	30	9	22.3	84	30	31	9.0	84	30	191	6.3	76	29	25	12.7	65
1,000	30	163	21.9	83	30	156	8.9	79	30	144	(*)	----	29	162	12.2	64
950	30	606	20.2	76	30	580	7.3	75	30	558	5.8	70	29	595	10.9	63
900	30	1,074	17.5	77	30	1,024	5.0	71	30	1,007	4.6	67	29	1,041	9.0	61
850	30	1,561	14.8	74	30	1,488	2.6	68	30	1,472	3.1	66	29	1,513	7.2	61
800	30	2,072	12.4	60	30	1,977	.3	61	30	1,992	1.7	55	29	2,010	4.9	59
750	30	2,613	9.5	51	30	2,495	−2.4	54	29	2,488	−.5	58	29	2,538	1.8	56
700	30	3,180	6.1	46	30	3,036	−5.5	52	29	3,028	−3.6	57	29	3,087	−.9	52
650	30	3,786	2.7	39	30	3,615	−8.8	48	29	3,617	−6.8	57	29	3,679	−3.8	48
600	30	4,427	−1.0	38	30	4,230	−12.6	46	29	4,230	−10.4	59	29	4,304	−7.6	44
550	29	5,114	−4.9	35	30	4,887	−17.0	47	28	4,900	−14.5	55	29	4,977	−11.8	46
500	29	5,858	−9.8	----	30	5,597	−21.9	----	28	5,612	−19.1	53	29	5,699	−16.7	50
450	29	6,669	−14.9	----	30	6,367	−27.1	----	28	6,399	−24.4	----	29	6,487	−22.2	----
400	29	7,545	−20.9	----	30	7,203	−33.1	----	28	7,236	−30.4	----	29	7,338	−28.2	----
350	29	8,517	−28.1	----	28	8,125	−39.8	----	28	8,171	−37.4	----	29	8,282	−35.2	----
300	29	9,604	−36.4	----	27	9,172	−46.4	----	27	9,217	−45.1	----	29	9,337	−43.5	----
250	28	10,839	−46.4	----	25	10,370	−53.2	----	27	10,416	−52.6	----	29	10,539	−52.7	----
200	27	12,281	−57.0	----	16	11,814	−56.6	----	25	11,834	−58.7	----	23	11,961	−60.5	----
175	22	13,118	−60.9	----	10	12,672	−55.5	----	20	12,675	−58.6	----	19	12,791	−62.0	----
150	13	14,104	−65.1	----	7	13,650	−53.6	----	15	13,637	−57.9	----	13	13,738	−60.9	----
125	7	15,179	−67.9	----					7	14,764	−56.0	----	7	14,817	−61.0	----

[1] Data not yet received.

*Temperature and relative humidity data for this level are not available or are available only for certain days. See note entitled "Change in Summarization of Radiosonde Data," p. 6, in the January 1946 issue of the MONTHLY WEATHER REVIEW.

NOTE.—All observations scheduled between 0300 and 0500, G. C. T., except at Ciudad Victoria, Mazatlan, and Merida, where they are taken near 0200, G. C. T.

"Number of observations" refers to those of dynamic height only. (In a few cases temperature or humidity data may be missing for one or more standard pressure surfaces of some observations.) Relative humidity data are not published for standard pressure surfaces having a corresponding mean temperature below −20° C.

All relative humidity observations are obtained by electric hygrometer and have been adjusted to compensate for the values occurring below the operating range of the humidity element. For explanation of the adjustment see article entitled "Curve Method for Obtaining Monthly Means of Relative Humidity," p. 241, MONTHLY WEATHER REVIEW, December 1944.

None of the means included in these tables are based on less than 15 observations at the surface or 5 observations at a standard pressure level.

714445—47——2

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m., E. S. T. (2200 G. C. T.) during April 1947. Directions given in degrees from north (N=360°, E=90°, S=180°, W=270°). Velocities in meters per second*

Altitude (meters) m. s. l.	Abilene, Tex. (534 m.)			Albuquerque, N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (868 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (100 m.)			Charleston, S. C. (16 m.)			Cincinnati, Ohio (150 m.)			Denver, Colo. (1,627 m.)			El Paso, Tex. (1,198 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	206	1.9	29	270	3.2	28	228	1.3	27	301	2.7	27	268	2.6	30	320	4.4	29	126	5.3	27	242	4.4	28	249	2.6	28	158	2.5	25	228	1.8	27	348	2.2	30	244	4.0
500							28	235	1.5										28	142	7.9	27	241	6.4	28	245	3.8	28	172	4.6	25	215	3.0						
1,000	29	215	4.4				27	234	2.8				27	284	3.7	30	319	4.8	25	160	9.5	26	245	9.2	27	248	4.8	23	221	4.7	19	216	6.9						
1,500	26	224	5.2				26	244	3.8	27	298	5.0	26	290	4.6	30	310	5.5	22	178	9.2	22	242	10.6	21	263	7.8	22	248	6.0	18	229	7.6				30	247	5.0
2,000	22	234	8.4	29	249	4.8	24	246	5.7	24	295	5.7	22	290	7.0	30	307	5.3	21	196	7.3	17	248	9.9	19	264	10.8	21	258	8.2	14	255	8.2	27	334	2.0	30	251	5.0
2,500	20	237	10.0	29	261	4.4	21	258	6.8	24	291	6.2	22	291	7.9	30	305	5.8	19	207	6.1	11	261	12.8	13	277	13.4	20	256	9.6	11	263	9.8	27	298	1.6	29	259	4.7
3,000	18	239	11.2	29	263	4.2	19	263	8.7	23	288	8.0	19	294	9.3	28	294	5.4	18	222	5.8				10	287	15.6	19	261	9.1				24	262	3.7	28	260	6.6
4,000	15	246	14.0	28	266	8.2	13	278	11.6	20	299	10.6	14	296	11.1	20	315	6.1	17	221	6.3							17	262	13.5				21	270	7.5	26	259	12.1
5,000	14	248	16.2	24	285	13.1	11	269	13.2	16	310	9.2	10	301	8.8	17	317	7.5	15	230	7.3							13	261	13.2				16	286	10.0	25	257	15.8
6,000	14	252	21.4	22	274	14.1				15	302	9.9				15	303	7.7	14	237	12.4							13	263	14.7				14	302	10.2	23	258	16.6
8,000	12	263	21.9	16	288	14.4																															21	258	21.9
10,000				10	277	22.3																															13	254	23.2

Altitude (meters) m. s. l.	Ely, Nev. (1,910 m.)			GrandJunction, Colo. (1,475 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Joliet, Ill. (178 m.)			Las Vegas, Nev. (575 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (416 m.)			Miami, Fla. (12 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)			New York, N. Y. (15 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	322	3.4	30	311	2.3	28	217	2.6	26	289	3.1	30	103	2.4	27	224	2.2	30	314	0.5	28	161	1.7	30	324	1.7	30	125	4.8	27	165	1.6	30	222	2.2	25	228	2.5
500							28	214	3.8				28	159	2.8	27	247	2.5				27	208	3.3	30	316	1.8	30	120	5.7	27	193	2.9	30	204	4.0	25	254	5.1
1,000							28	214	4.7	26	279	3.3	25	222	3.6	25	246	4.7	30	269	1.2	25	216	4.3	30	302	2.3	30	132	4.2	22	248	1.4	27	200	5.7	24	264	7.7
1,500				30	294	3.6	25	233	7.1	26	268	4.0	21	245	5.2	19	251	4.2	30	223	1.3	22	219	5.2	29	268	2.0	28	146	1.7	23	275	2.6	25	223	6.5	23	265	9.6
2,000	29	328	3.5	30	288	4.0	21	258	8.8	23	265	5.6	21	250	6.6	17	281	6.5	30	234	2.4	21	234	6.5	25	270	1.3	26	208	1.1	19	267	4.9	22	230	8.8	18	268	12.4
2,500	29	327	2.8	30	284	3.0	20	269	10.4	21	265	8.2	19	246	6.9	14	280	9.1	29	274	3.2	19	282	8.8	24	282	.9	24	225	.8	15	278	5.2	21	244	11.2	16	270	14.7
3,000	28	321	2.8	28	281	2.7	19	269	12.7	18	281	8.4	17	244	7.0	13	278	11.3	29	292	4.1	17	254	10.4	23	323	1.7	22	215	.8	15	279	6.6	21	246	12.2	10	276	13.6
4,000	21	304	5.0	24	258	4.2	15	270	14.3	12	302	10.2	16	253	8.3				28	305	5.0	15	255	14.1	16	327	5.7	20	208	1.9	12	271	9.4	18	255	13.7			
5,000	17	322	10.2	20	276	5.8				10	305	10.7	16	255	11.4				20	318	7.9	11	265	14.5	13	3	5.6	14	284	2.4				11	256	12.1			
6,000	12	334	12.1	14	315	9.1							15	253	14.2				19	324	10.7	10	262	19.2	13	10	7.4	14	278	5.2				10	265	14.4			
8,000																			12	338	17.5																	

Altitude (meters) m. s. l.	Oakland, Calif. (8 m.)			Oklahoma City, Okla. (396 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (338 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			St. Paul, Minn. (225 m.)			San Antonio, Tex. (240 m.)			San Diego, Calif. (13 m.)			Sault Ste. Marie, Mich. (225 m.)			Seattle, Wash. (116 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	30	268	4.9	25	187	1.8	27	280	1.7	30	239	1.2	27	336	5.2	28	206	1.3	25	286	1.8	29	162	2.4	30	257	3.1	23	318	3.5	29	254	3.2	29	233	2.0	28	210	4.1
500	30	289	4.0	25	187	2.1	27	280	2.0	30	237	2.2				28	218	2.3	25	291	1.7	29	151	3.0	30	274	2.9	23	317	4.0	29	238	4.0				28	218	5.5
1,000	29	328	3.2	24	208	3.5	25	249	2.8	30	239	3.5	27	336	5.2	25	211	4.6	20	253	3.0	29	159	4.0	25	289	1.3	22	297	3.7	29	231	4.8	29	246	4.0	27	229	6.3
1,500	28	334	4.1	21	212	4.2	22	238	4.4	30	244	4.0	27	335	5.3	24	228	6.3	16	275	5.0	21	187	4.3	24	318	2.0	18	284	5.1	26	238	4.5	28	245	5.2	24	241	7.8
2,000	27	338	4.5	21	236	6.6	17	243	6.5	30	252	4.3	24	319	6.0	22	245	8.4	16	278	7.1	21	216	5.9	23	323	3.2	18	291	8.0	23	262	4.9	24	261	5.8	22	256	10.8
2,500	25	328	4.2	18	250	8.9	14	265	8.4	30	265	4.1	20	290	6.0	19	255	12.3	15	285	7.2	18	241	6.3	21	318	3.3	16	293	11.4	19	269	5.9	21	264	5.1	22	270	13.4
3,000	24	333	4.9	17	263	11.3	13	255	9.4	30	270	4.8	19	293	7.5	18	252	13.8				14	252	8.5	19	333	3.6	15	289	13.1	19	290	6.2	17	277	5.8	21	270	14.7
4,000	24	336	6.0	14	272	14.7	11	270	9.2	29	275	6.0	10	304	7.9	16	260	15.7				13	252	12.0	19	312	5.8	12	296	18.2	15	296	9.1	11	278	8.0	19	277	18.6
5,000	23	328	7.5	11	277	17.1				25	274	8.3				13	263	19.0				13	257	14.0	17	312	7.7				15	296	11.6	11	294	9.7	18	270	22.2
6,000	22	325	8.5							24	276	11.7				10	272	18.3				13	263	15.1	17	317	10.1				14	298	11.1	11	290	9.8	14	271	22.8
8,000	12	314	9.2							14	283	15.0													12	325	13.9							10	314	15.3			

TABLE 3.—*Maximum free-air wind velocities (m. p. s.) for different sections of the United States based on pilot balloon observations during April 1947*

Section	Surface to 2,500 meters (m. s. l.)					2,501 to 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northeast [1]	47.6	wsw.	1,488	6	Akron, Ohio	36.7	sw.	2,501	5	Akron, Ohio	75.8	nw.	10,738	3	Akron, Ohio.
East-Central [2]	50.7	ssw.	2,500	5	Louisville, Ky	53.2	ssw.	2,619	5	Louisville, Ky	72.0	wnw.	12,830	2	Hatteras, N. C.
Southeast [3]	36.8	ssw.	1,700	5	Birmingham, Ala	33.4	sw.	3,871	16	Charleston, S. C	70.0	wsw.	13,972	17	Miami, Fla.
North-Central [4]	38.6	sw.	1,188	6	Muskegon, Mich	52.6	nw.	4,995	14	Bismarck, N. Dak	83.0	wsw.	9,621	5	Sault Ste. Marie, Mich.
Central [5]	51.4	wsw.	1,534	6	Springfield, Ill	47.4	s.	3,959	5	Columbia, Mo	74.0	ssw.	10,179	11	Columbia, Mo.
South-Central [6]	55.4	sw.	2,500	5	Memphis, Tenn	63.8	sw.	3,663	5	Memphis, Tenn	84.8	sw.	11,369	12	Little Rock, Ark.
Northwest [7]	48.4	nw.	1,884	4	Burns, Oreg	48.2	nw.	5,000	4	Tatoosh Is., Wash	72.0	w.	10,043	29	Tatoosh Is., Wash.
West-Central [8]	38.8	nw.	2,093	5	Cheyenne, Wyo	50.8	nnw.	5,000	9	Oakland, Calif	75.0	wsw.	9,214	3	Grand Junction, Colo.
Southwest [9]	39.0	nnw.	2,178	5	Sandberg, Calif	62.0	nnw.	2,727	9	Sandberg, Calif	86.0	wsw.	10,425	3	Las Vegas, Nev.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, southern Ohio, Kentucky, eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, northern Nevada, and northern California.
[9] Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

RIVER STAGES AND FLOODS FOR APRIL 1947

C. R. JORDAN

Precipitation was above normal during April over most of the eastern half of the United States. There was also an area of above-normal precipitation covering eastern Washington and northern Idaho, and a narrow belt extending through central Nevada, northwestern Utah, and western Wyoming. The greatest departures from normal were in Nebraska, Kansas, Iowa, northern Illinois, and southern Michigan, where more than twice the usual amounts were recorded. It was drier than usual in most of Tennessee, North Carolina, Virginia, and West Virginia, and in the western part of the country, except for the two areas previously mentioned. Less than half the normal amounts fell over a broad strip from southern Texas to southern California, and no precipitation occurred in southwestern Arizona and southeastern California.

Damaging floods occurred from northern Illinois to western New York and northern Pennsylvania as a result of heavy precipitation, augmented somewhat by melting snow. The greatest overflow since 1904 occurred in southern Michigan. Run-off was excessive over a broad strip of the Central Valley region from North Dakota and Minnesota to the central Gulf region, and considerable flooding occurred in many streams.

Drought conditions continued in the Far Southwest.

Hudson Bay drainage.—Considerable damage accompanied the annual break-up of the Red River of the North, below Fargo, N. Dak. The crest of the river at Grand Forks, N. Dak., exceeded that of the 1943 flood but was considerably below the record stage of 1897.

Great Lakes drainage.—Record floods in Michigan occurred as a result of heavy rains on above-normal snow cover. The heavy rains fell in two distinct storm periods, April 1–2 and April 4–6.

Moderate rain over southern Michigan on April 1 and 2, raised river levels to near-flood stage, and in a few streams, including the Red Cedar River, to slightly above flood stage. The streams were still high and just beginning to recede when general rains began again on the 4th and continued through the 5th and 6th. These rains reached heavy proportions, generally ranging from 2 to 3 inches over southern Michigan and reaching as much as 4 inches in some areas. In consequence, all streams over the affected region rose steadily, culminating in the greatest overflow in southern Michigan since the great flood of 1904. The floods rank among the worst of record in the Mount Clemens, Flint, Williamston, East Lansing, Lansing, Grand Rapids, Battle Creek, and Kalamazoo areas, and doubtless in many other localities. Devastation was widespread and estimated damage reached into millions of dollars. A tabulation of crest stages at numerous stations as compared with the previous highest stages of record follows:

TABLE 1.—*Crests of 1947 floods as compared with previous highest stages of record*

River and station	Flood stage	April 1947		Prior to 1947	
		Stage [1]	Date	Stage	Date
Red Cedar:					
Williamston, Mich.	7	12.0	6	9.3	Feb. 14, 1938.
East Lansing, Mich.	8	12.3	7	12.0	Mar. 15, 1918.
Grand:					
Eaton Rapids, Mich.	6	9.1	6	8.8	Mar. 14, 1918.
Diamondale, Mich.	7	8.0	6	6.9	June 3, 1943.
Lansing, Mich.	11	16.9	7	16.7	Mar. 15, 1918.
Grand Ledge, Mich.	11	12.0	7	11.9	Feb. 16, 1918.
Grand Rapids, Mich.	15	17.6	9	18.5	Jan. 24, 1907.
Shiawassee: Owosso, Mich.	7	10.3	6	9.0	Mar. 17, 1942.
Flint: Flint, Mich.	11	16.3	6	11.2	Feb. 13–14, 1938.
Cass: Vassar, Mich.	14	17.8	6	19.0	Mar. 18, 1942.
Saginaw: Saginaw, Mich.	19	20.0	8	24.3	Mar. 31, 1916.

[1] Preliminary.

The St. Marys River at Decatur, Ind., and the St. Joseph River at Montpelier, Ohio, exceeded flood stage during the month.

Atlantic Slope drainage.—Flood stages were reached on many streams from Maine to Georgia but in general there was no severe or extensive overflow. The Northeast was fortunate again this year in having a heavy snow cover melt gradually and move downstream without damaging stages or severe ice trouble.

Local floods in the upper Susquehanna River Basin on April 5 caused considerable damage in some areas. Flooding occurred in the lower portions of Wellsboro, Pa., and cities and towns in the Lackawanna River Valley. In the period April 1–5, 2 inches of rain fell in the Susquehanna drainage above Towanda, Pa., and 2.7 inches from Towanda to Wilkes-Barre, Pa. The Susquehanna and most of its tributaries at and above Wilkes-Barre exceeded flood stage but caused little or no damage in the main rivers.

East Gulf of Mexico drainage.—The Choctawhatchee River exceeded flood stage slightly on two occasions during the month.

Two periods of flood stages were also experienced on the Lower Tombigbee River and one period on the Upper Tombigbee River. Substantial rises were recorded on the Warrior River, but no flood stages were reached. The Alabama River was above flood stage at Millers Ferry, Ala., from the 18th to the 22d.

Locally, heavy rains fell over the Pearl River Basin on several occasions during the first halt of April. Flood stages were reached in the upper portions of the stream near the middle of the month, and from Jackson, Miss., to Pearl River, La., the river was above flood stage most of the month. It remained above flood stage at the beginning of May. Damage was not great, and losses were limited mostly to lumbering operations in the river swamps and to loss of wages in those areas. Some damage to roads and bridges resulted from the flood waters.

Mississippi Basin.—Light overflow occurred at many points throughout the Mississippi Valley. Record-breaking floods occurred on April 5–7, in the head waters of the Allegheny River in Pennsylvania and New York.

Moderate flood stages were reached on the Mississippi River from Muscatine, Iowa, to below the mouth of the Ohio River. Flood stages were also exceeded in the lower portions of the Missouri, Arkansas, and Ohio Rivers as well as in many smaller tributaries. Overflow was generally not severe.

Severe local flooding occurred in the headwaters of the Allegheny River in northwestern Pennsylvania and western New York. The flooding resulted from 2 to 5 inches of rain accompanied by melting snow. The Allegheny River at Warren, Pa., exceeded the previous maximum stage of record that occurred in 1913 by almost 2 feet. The main street of Bradford, Pa., was covered by 6 feet or more of water, and much of the city of Meadville, Pa., was also flooded. Damage was estimated at more than a million dollars.

Local flooding did considerable damage in Carroll and Holmes Counties, Miss., as a result of heavy showers, averaging between 6 and 7 inches, which fell over most of Carroll and Holmes counties between 1 and 4 a. m., on the 11th. Many bridges were destroyed and considerable damage was done to flood control works.

West Gulf of Mexico drainage.—Flood stages were exceeded slightly during the month at a few stations in eastern Texas.

FLOOD STAGE REPORT FOR APRIL 1947

[All dates in April unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest[1]	
		From—	To—	Stage	Date
HUDSON BAY DRAINAGE					
Red of North:	*Feet*			*Feet*	
Wahpeton, N. D.	6	8	15	7.8	12
Moorhead, Minn.	17	10	23	28.9	15
Grand Forks, N. D.	28	13	(2)	40.7	21
ST. LAWRENCE DRAINAGE					
Lake Michigan					
Red Cedar:					
Williamston, Mich.	7	3	9	12.0	6
East Lansing, Mich.	8	3	10	12.3	6
Grand:					
Eaton Rapids, Mich.	6	5	12	9.1	6
Diamondale, Mich.	7	5	8	8.0	6
Lansing, Mich.	11	4	10	16.9	7
Grand Ledge, Mich.	11	6	8	12.0	7
Ionia, Mich.	21	6	10	23.6	7
Lowell, Mich.	15	6	12	18.5	7-8
Grand Rapids, Mich.	15	7	12	17.6	9
Lake Huron					
Shiawassee: Owosso, Mich.	7	4	11	10.3	6
Flint: Flint, Mich.	11	5	10	16.3	6
Cass: Vassar, Mich.	14	5	7	17.8	6
Saginaw: Saginaw, Mich.	19	7	10	19.8	8
Lake Erie					
St. Marys: Decatur, Ind.	13	26	26	13.3	26
		30	(2)	13.0	30
St. Joseph: Montpelier, Ohio	10	3	13	13.7	7
		20	26	14.2	21
ATLANTIC SLOPE DRAINAGE					
Merrimack:					
Franklin Junction, N. H.	14	13	13	14.0	13
Bow, N. H.	5.5	14	14	5.5	14
Connecticut:					
South Newbury, Vt.	22	13	15	24.2	13
White River Junction, Vt.	18	12	14	19.0	12
Walpole, N. H.	30	13	13	30.9	13
Montague City, Mass.	28	12	14	31.3	13
Holyoke, Mass.	9	13	14	9.3	13
Hartford, Conn.	16	8	10	16.3	9
		13	18	20.3	14
Lackawaxen: Hawley, Pa.	9	5	5	10.0	5
Unadilla: Rockdale, N. Y.	11	7	7	10.2	7
Tioughnioga: Whitney Point, N. Y.	12	5	11	14.0	5
Chenango:					
Sherburne, N. Y.	8	6	9	9.4	6
Greene, N. Y.	8	6	8	10.5	7
Binghampton, N. Y.	16	5	6	18.0	6
Chemung:					
Corning, N. Y.	16	6	6	17.0	6
Elmira, N. Y.	12	5	6	16.0	6
Chemung, N. Y.	12	6	7	18.0	6
Susquehanna:					
Oneonta, N. Y.	12	3	15	16.4	6
Unadilla, N. Y.	11	6	7	11.1	6
Bainbridge, N. Y.	13	6	8	15.5	6
Conklin, N. Y.	11	5	7	15.0	6
Binghamton, N. Y.	14	5	5	14.0	5
Vestal, N. Y.	14	4	10	20.8	6
Towanda, Pa.	16	5	7	19.6	6
Wilkes-Barre, Pa.	22	6	7	24.8	7
Danville, Pa.	20	7	7	20.0	7
James: Columbia, Va.	10	3	3	10.3	3
Roanoke: Williamston, N. C.	10	21	25	10.5	22
Neuse: Goldsboro, N. C.	14	18	20	14.4	19
Cape Fear: Lock No. 2, Elizabethtown, N. C.	20	16	19	23.6	17
Pee Dee: Mars Bluff Bridge, S. C.	17	17	22	18.2	19
Black: Kingstree, S. C.	12	18	20	12.3	19
Edisto: Orangeburg, S. C.	7	13	23	8.2	18
Savannah: Butler Creek, Ga.	21	16	16	21.3	16
Ogeechee: Dover, Ga.	7	1	26	8.6	17
Ocmulgee: Abbeville, Ga.	11	17	25	12.4	18
Oconee: Milledgeville, Ga.	20	15	15	20.0	15
Altamaha:					
Charlotte, Ga.	12	1	11	12.8	4-5
		16	(2)	16.8	23-24
Piney Bluff, Ga.	17	18	26	19.0	22
EAST GULF OF MEXICO DRAINAGE					
Flint: Albany, Ga.	20	17	17	21.5	17
Apalachicola: Blountstown, Fla.	15	1	(2)	20.5	20
Choctawhatchee: Caryville, Fla.	12	5	7	12.2	6
		16	21	13.1	18
Alabama: Millers Ferry, Ala.	40	18	22	42.2	21
Black Warrior: Lock No. 7, Eutaw, Ala.	35	14	19	39.8	16-17
Tombigbee:					
Aberdeen, Miss.	34	13	17	37.3	13
Columbus, Miss.	29	15	16	29.4	15
Gainesville, Ala.	36	15	26	43.4	21-22
Lock No. 4, Demopolis, Ala.	39	13	28	51.5	19
Lock No. 3	33	2	4	37.1	3
		12	(2)	53.3	21
Lock No. 2	46	14	20	54.9	22

FLOOD STAGE REPORT FOR APRIL 1947—Continued

River and station	Flood stage	Above flood stages—dates		Crest[1]	
		From—	To—	Stage	Date
EAST GULF OF MEXICO DRAINAGE—con.					
	Feet			*Feet*	
Lock No. 1	31	2	6	33.2	4
		14	(2)	37.2	24
Pascagoula: Merrill, Miss.	22	3	7	22.7	6
		15	22	23.4	17
Bogue Chitto: Franklinton, La.	11	1	6	15.2	2
Pearl:					
Edinburg, Miss.	20	14	19	21.9	16
Goshen Springs, Miss.	20	14	23	21.5	18
Jackson, Miss.	18	10	(2)	29.1	21
Monticello, Miss.	15	3	5	19.0	4
		9	(2)	20.9	16
Columbia, Miss.	17	2	7	18.9	4
		11	(2)	20.3	17
Pearl River, La.	12	1	(2)	16.0	16
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Rock: Moline, Ill.	10	6	14	10.6	7-8
		21	28	10.7	23-24
Iowa: Wapello, Iowa	10	19	23	11.0	23
Zumbro: Theilman, Minn.	35	6	6	36.1	6
Whitewater: Beaver, Minn.	7	5	6	9.8	5
Des Moines:					
Tracy, Iowa	14	5	6	17.0	6
		11	14	16.6	12
		20	21	16.0	21
Eddyville, Iowa	15	5	7	19.4	6
		11	15	18.4	12
		20	22	18.5	21
Ottumwa, Iowa	9	5	7	12.7	7
		11	15	11.4	13
		20	22	11.4	22
Illinois:					
Morris, Ill.	13	6	8	21.2	6
Peru, Ill.	17	6	13	22.9	6
		21	25	18.0	22
Peoria, Ill.	18	8	16	20.0	10
Havana, Ill.	14	7	(2)	17.9	11
Beardstown, Ill.	14	7	(2)	17.7	14-16
Bourbeuse: Union, Mo.	12	26	28	18.4	27
Meramec:					
Sullivan, Mo.	11	25	27	25.5	26
Pacific, Mo.	11	22	22	13.0	22
		25	29	24.0	28
Valley Park, Mo.	14	25	30	28.2	28
Mississippi:					
Gordons Ferry, Iowa	13	12	27	13.9	17
Muscatine, Iowa	15	20	25	15.6	23
Keithsburg, Ill.	12	15	26	13.5	23
Louisiana, Mo.	12	1	7	12.2	1
		14	15	12.3	15
		19	19	12.0	19
		22	22	12.0	22
		25	27	12.1	25-27
Grafton, Ill.	18	8	(2)	24.6	28
St. Louis, Mo.	30	12	19	30.8	18
		25	(2)	34.4	28
Chester, Ill.	27	10	(2)	34.7	30
Cape Girardeau, Mo.	32	11	(2)	38.7	30
Missouri Basin					
Solomon: Beloit, Kans.	18	10	12	22.4	11
		30	(2)	21.1	30
Republican: Clay Center, Kans.	15	10	11	17.4	10
Little Blue:					
Endicott, Nebr.	9	10	10	9.2	10
Hanover, Kans.	14	10	12	16.3	12
Big Blue:					
Barnston, Nebr.	18	10	11	22.2	11
Blue Rapids, Kans.	20	10	12	23.4	12
Randolph, Kans.	22	11	12	22.6	12
Kansas:					
Manhattan, Kans.	17	11	12	19.4	11
Wamego, Kans.	16	12	12	16.4	12
LeCompton, Kans.	17	11	11	17.1	11
Grand:					
Gallatin, Mo.	20	5	6	23.1	5
Chillicothe, Mo.	18	4	8	30.7	6
		11	13	26.4	11
		21	21	22.1	21
Brunswick, Mo.	12	5	18	20.7	9
		21	24	13.8	22
Pottawatomie: Garnett, Kans.	26	5	5	28.8	5
Osage:					
Quenemo, Kans.	30	5	6	33.8	5
		11	11	33.8	11
Ottawa, Kans.	24	5	7	27.6	6
		11	12	27.1	12
Oswatomie, Kans.	28	5	8	35.8	6
		11	16	33.6	13
LaCygne, Kans.	25	5	18	30.0	7-8
Trading Post, Kans.	24	5	19	27.0	8
Osceola, Mo.	22	12	20	25.4	13
		25	28	28.0	27
Warsaw, Mo.	31	12	18	32.0	14
		25	29	34.4	27
Lakeside (Bagnell Dam), Mo.	60	15	17	60.2	16
		25	29	61.8	27

See footnotes at end of table.

FLOOD STAGE REPORT FOR APRIL 1947—Continued

River and station	Flood stage	Above flood stages—dates		Crest [1]	
		From—	To—	Stage	Date
***Missouri Basin*—Continued**					
Osage—Continued	*Feet*			*Feet*	
St. Thomas, Mo.	23	16	17	23.0	16, 17
		25	[2]	29.8	28
Gasconade: Jerome, Mo.	15	25	28	23.4	27
Missouri:					
Mobridge, S. D.	16	Mar. 30	Mar. 31	18.3	Mar. 31
Pierre, S. D.	15	1	1	16.5	1
Blair, Nebr.	19	5	6	20.0	6
Nebraska City, Nebr.	15	4	8	17.2	7
		10	12	16.2	11
St. Joseph, Mo.	17	26	26	17.0	26
Kansas City, Mo.	22	12	13	23.3	12
Lexington, Mo.	22	5	8	23.2	6
		11	15	23.9	13
Waverly, Mo.	18	5	15	21.8	13
Boonville, Mo.	21	6	17	25.5	11
Jefferson City, Mo.	23	7	17	25.8	11
Hermann, Mo.	21	7	19	25.7	12, 13
		25	[2]	26.3	26
St. Charles, Mo.	25	7	[2]	31.8	27
Ohio Basin					
Allegheny:					
Olean, N. Y.	10	5	9	15.8	7
Warren, Pa.	14	5	8	17.0	5
Franklin, Pa.	17	6	7	19.1	6
Lock No. 4, Natrona, Pa.	24	6	7	25.8	6
Lock No. 3, Acmetonia, Pa.	25	7	7	26.3	7
Port Allegheny, Pa.	9	6	6	10.8	6
Scioto:					
Circleville, Ohio	14	22	22	14.2	22
Piketon, Ohio	15	22	24	18.3	22
		27	28	15.6	28
Rough: Dundee, Ky.	25	17	21	27.4	19
Green:					
Lock No. 4, Woodbury, Ky.	33	18	19	33.7	18
Lock No. 2, Rumsey, Ky.	34	20	22	34.6	20
West Fork:					
Anderson, Ind.	10	26	26	10.7	26
Elliston, Ind.	13	12	14	20.0	13
		26	[2]	21.6	28
		6	19	18.0	13-14
Edwardsport, Ind.	12	21	22	12.3	22
		26	[2]	19.4	30
East Fork: Seymour, Ind.	14	27	28	14.5	27
White:					
Petersburg, Ind.	16	11	21	18.8	15-16
		26	[2]	19.7	29
Hazleton, Ind.	16	9	[2]	20.6	30
Wabash:					
Wabash, Ind.	12	30	[2]	15.8	30
Lafayette, Ind.	11	13	13	11.4	13
		22	23	11.9	22
		27	28	12.9	27
		30	[2]	13.0	30
Covington, Ind.	16	28	28	16.1	28
		30	[2]	16.7	30
Terre Haute, Ind.	14	26	[2]	15.2	27, 30
Vincennes, Ind.	14	26	[2]	15.7	30
Mt. Carmel, Ill.	17	27	[2]	19.3	30
New Harmony, Ind.	15	30	[2]	15.0	30
Ohio:					
Shawneetown, Ill.	33	14	17	33.7	15
Lock No. 50, Fords Ferry, Ky.	34	13	22	35.9	15-16
Dam No. 52, Brookport, Ill.	37	15	22	38.5	19
Dam No. 53, Mound City, Ill.	42	12	[2]	46.5	18
Cairo, Ill.	40	10	[2]	47.1	20
White Basin					
Black:					
Poplar Bluff, Mo.	16	13	13	16.3	13
		27	28	18.8	27
Black Rock, Ark.	14	11	18	15.8	12
		29	[2]	14.8	30
White:					
Batesville, Ark.	23	28	28	23.0	28
Georgetown, Ark.	21	18	22	21.6	19-20
Clarendon, Ark.	26	23	[2]	26.4	25-27
St. Charles, Ark.	25	26	[2]	25.3	30
Arkansas Basin					
Little Arkansas:					
Sedgwick, Kans.	18	11	11	19.3	11
		13	14	23.1	13
Ripley, Kans.	11	14	14	13.3	14

FLOOD STAGE REPORT FOR ARRIL 1947—Continued

River and station	Flood stage	Above flood stages—dates		Crest [1]	
		From—	To—	Stage	Date
***Arkansas Basin*—Continued**					
	Feet			*Feet*	
Ninnescah: Peck, Kans.	17	11	11	17.4	11
		14	14	18.5	14
Walnut: Winfield, Kans.	23	13	16	31.0	14
Deep Fork: Dewar, Okla.	18	20	[2]	20.6	22
Cimarron: Perkins, Okla.	11	14	16	13.5	14
Verdigris:					
Independence, Kans.	36	13	16	41.8	15
Coffeyville, Kans.	20	16	17	21.6	16
Claremore, Okla.	38	16	21	44.4	20
		26	27	38.3	27
Cottonwood: Emporia, Kans.	20	11	16	24.2	14
Neosho:					
Neosho Rapids, Kans.	22	12	15	23.0	12
Burlington, Kans.	27	13	17	30.4	13
		5	5	24.1	5
LeRoy, Kans.	23	11	11	23.2	11
		13	17	25.3	13
		5	6	19.0	5
Iola, Kans.	15	11	18	19.1	16
		5	7	24.5	6
Chanute, Kans.	20	11	20	25.2	16
Parsons, Kans.	24	14	20	23.4	19
		8	9	19.1	9
Oswego, Kans.	17	12	21	21.8	19-20
		26	26	18.5	26
North Canadian: Yukon, Okla.	11	12	16	13.0	13
		29	29	12.4	29
Poteau: Poteau, Okla.	21	11	14	27.0	12
Fouche La Faye: Perryville, Ark.	20	13	23	24.4	18
		28	[2]	25.3	30
Arkansas:					
Oxford, Kans.	14	15	15	14.3	15
Arkansas City, Kans.	16	12	17	20.2	15
Ralston, Okla.	16	15	17	19.4	16
Tulsa, Okla.	12	15	18	15.9	16
Webbers Falls, Okla.	23	15	19	26.4	16
		26	[2]	24.8	29
		12	13	22.6	13
Fort Smith, Ark.	22	16	20	25.4	17
		27	[2]	25.2	30
			20	25.4	17
Van Buren, Ark.	22	16		24.9	27
		27	[2]	25.8	30
		14	14	22.0	14
Dardanelle, Ark.	22	17	20	24.0	15
		29	[2]	22.4	29
Red Basin					
Sulphur:					
Hagansport, Tex.	38	14	16	38.4	15
Naples, Tex.	22	17	24	24.7	19
Lower Mississippi Basin					
St. Francis:					
Fisk, Mo.	20	12	20	22.7	14-15
		26	[2]	23.1	28-30
St. Francis, Ark.	18	15	[2]	19.7	19-20
Tallahatchie: Swan Lake, Miss.	26	15	23	27.8	18
Yazoo: Greenwood, Miss.	35	18	24	35.7	20
Mississippi:					
New Madrid, Mo.	34	13	[2]	37.5	20-21
Caruthersville, Mo.	32	14	[2]	35.8	21-22
Atchafalaya Basin					
Atchafalaya: Atchafalaya, La.	25	19	[2]	26.4	29-30
WEST GULF OF MEXICO DRAINAGE					
Whiskey Chitto: Mittie, La.	15	12	14	18.9	12
Calcasieu: Kinder, La.	16	13	17	17.8	14
Sabine:					
Mineola, Tex.	14	13	22	17.3	15
Gladewater, Tex.	26	18	25	31.4	21
Neches: Evadale, Tex.	16	1	1	16.0	1
East Fork: Rockwall (nr.), Tex.	10	16	18	11.6	17
Trinity:					
Trinidad, Tex.	28	14	19	33.4	16
Long Lake, Tex.	40	20	22	40.9	20
Liberty, Tex.	24	26	28	24.4	28
Guadalupe: Victoria, Tex.	21	16	16	21.3	16

[1] Provisional.
[2] Continued at end of month.

CLIMATOLOGICAL DATA FOR APRIL 1947

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see Review, January 1943, p. 15]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation					
			Monthly extremes								Greatest monthly		Least monthly	
	Section average	Departure from the normal	Station	Highest	Date	Station	Lowest	Date	Section average	Departure from the normal	Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.		In.	In.		In.		In.
Alabama	66.0	+2.5	Dothan	92	8	Valley Head	32	18	6.82	+2.19	Thomasville	11.21	Flat Rock	2.67
Arizona	58.2	−.2	Wellton	103	[1] 16	Alpine	8	13	.04	−.62	Littlefield	.86	46 stations	.00
Arkansas	61.9	+.3	Hot Springs	89	6	Lead Hill	26	17	5.74	+.71	El Dorado	9.03	Viola	1.79
California	57.9	+1.8	2 stations	108	[1] 15	Ellery Lake	−4	4	.67	−.99	Volta	4.14	8 stations	.00
Colorado	43.0	−.8	Eversoll Ranch	86	21	Taylor Park	−11	12	1.55	−.26	Wray	7.87	Olathe	T
Florida	74.4	+4.4	2 stations	94	7	Carrabelle	37	18	5.05	+2.12	Marianna	11.18	Lake Trafford	.00
Georgia	66.4	+2.9	4 stations	92	[1] 7	2 stations	31	18	5.22	+1.34	Eastman	10.17	Dalton	2.99
Idaho	45.3	+.1	Orofino	90	26	Island Park Dam	−2	5	1.17	−.26	Pierce	4.14	Salmon	.01
Illinois	52.1	−.4	E. St. Louis	86	23	Marengo	24	13	6.42	+2.80	Wheaton	9.42	Rockford	3.42
Indiana	52.0	+.1	2 stations	85	[1] 10	3 stations	25	[1] 3	7.03	+3.40	La Porte	15.90	Columbia City	4.46
Iowa	47.0	−2.0	Knoxville	85	30	2 stations	19	[1] 7	5.06	+2.44	Davenport	8.13	Osage	2.35
Kansas	52.5	−2.3	Lawrence	91	30	Syracuse	21	6	4.67	+1.96	Winfield	11.07	Healy	.59
Kentucky	57.8	+1.5	2 stations	90	[1] 5	Quicksand	28	18	4.84	+.86	St. John	8.76	Pippapass	1.39
Louisiana	68.4	+1.2	Donaldsonville	93	25	Plain Dealing	35	17	6.86	+2.16	Urania	16.46	Cravens	.90
Maryland-Delaware	54.5	+2.2	Cumberland, Md	90	5	2 stations, Del	20	[1] 4	2.74	−.74	Wilmington, Del	6.20	Luke, Md	1.41
Michigan	40.6	−2.2	2 stations	79	29	Watersweet	−5	13	4.85	+2.46	Niles	9.40	Curran	1.55
Minnesota	39.2	−3.8	Hallock	85	28	2 stations	6	8	3.40	+1.28	Canby	5.84	Baudette	.70
Mississippi	65.8	+1.1	Columbia	91	25	Batesville	32	17	7.89	+2.99	Ancona	12.76	Rosedale	3.39
Missouri	55.2	−.1	Union	90	23	Black (near)	22	17	6.78	+2.70	Neasho	12.28	Doniphan	3.22
Montana	43.2	−.1	Glendive	87	28	Circle	−2	7	.99	−.14	Mystic Lake	2.84	2 stations	.08
Nebraska	46.9	−2.4	Falls City	85	30	Mullen	12	7	2.76	+.35	Plattsmouth	7.08	Potter	.58
Nevada	49.7	+1.6	Overton	99	15	Seventy-one Ranch	10	4	.65	−.14	Lamoille	2.33	3 stations	.00
New England	42.2	−1.4	Waterbury, Conn	81	12	Fort Kent, Maine	0	29	3.54	+.20	Hatchville, Mass	7.20	Essex Junction, Vt	.75
New Jersey	50.6	+.8	Runyon	87	6	2 stations	18	[1] 1	4.33	+.72	Sussex	6.58	Pemberton	2.61
New Mexico	50.4	−1.2	Carlsbad	93	[1] 21	Truchas	−1	16	.42	−.47	Lake Maloya	3.08	13 stations	.00
New York	43.5	−.7	Port Jervis	82	6	Stillwater Reservoir	3	1	4.08	+1.06	Jamestown	8.07	Ticonderoga	1.14
North Carolina	61.0	+2.9	High Point	96	24	Mount Mitchell	19	17	3.44	−.14	Highlands	6.94	Waterville	1.56
North Dakota	39.9	−1.7	Towner	90	28	Golva	0	8	1.48	+.06	Casselton	4.11	Hansboro	.37
Ohio	50.7	+.9	Ironton	88	5	Millport	20	[1] 8	5.31	+2.10	Mt. Healthy	8.56	Dam No. 28	2.36
Oklahoma	59.0	−1.4	Altus	95	30	3 stations	25	[1] 6	6.87	+3.31	Oklahoma City	11.91	Kenton	1.35
Oregon	48.3	+1.1	Lake Creek	98	14	Olive Lake	5	8	1.84	−.14	Valsetz	7.96	Fremont	.22
Pennsylvania	49.1	+.5	Lancaster	85	6	2 stations	11	1	3.86	+.44	Erie	8.88	Hyndman	1.38
South Carolina	65.4	+3.0	Laurens	92	10	Walhalla	31	17	4.38	+1.10	Edgefield	7.91	McCormick	2.38
South Dakota	43.1	−2.8	Longvalley	86	14	Ralph	8	8	2.29	+.24	Wilmot	5.74	Redig	.85
Tennessee	60.7	+1.9	3 stations	87	[1] 5	2 stations	27	[1] 18	4.17	−.22	Halls	7.38	Gatlinburg	1.62
Texas	65.5	−.8	Riogrande	105	4	2 stations	23	[1] 13	2.28	−.71	Laredo	7.91	5 stations	.00
Utah	46.2	−.9	2 stations	88	[1] 14	Silver Lake	5	[1] 7	1.68	+.43	Alta	6.64	Mexican Hat	.03
Virginia	56.6	+2.0	3 stations	89	[1] 6	4 stations	20	[1] 1	2.47	−.79	Pedlar Dam	4.64	Luray	1.01
Washington	49.9	+1.3	Richland	92	27	Stockdill Ranch	17	6	2.51	+.05	Index	11.28	Ellensburg	.05
West Virginia	55.7	+3.8	Charleston	92	[1] 5	2 stations	17	[1] 2	2.11	−1.38	Canaan Valley	3.60	Moorefield	1.17
Wisconsin	41.5	−2.2	Menomonie	81	30	Rest Lake	0	13	3.91	+1.39	Darlington	6.86	Rib Falls	2.60
Wyoming	40.1	−.3	Basin	90	30	Lake Yellowstone	−11	8	1.63	+.01	Middle Fork	3.97	Powell	.27
Alaska (March)	15.8	+2.2	Tree Point Light Station.	59	[1] 18	Allakaket	−53	5	2.21	+.36	Little Port Walter	27.68	3 stations	T
Hawaii	70.7	+.9	Waianae	90	2	Haleakala R. S	39	5	4.58	−3.82	Makahanaloa	26.00	11 stations	.00
Puerto Rico	75.5	+1.0	Utuado	98	23	Utuado	51	5	2.67	−1.18	Toro Negro Reservoir	9.54	Santa Isabel	.25

[1] Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR APRIL 1947

District and station	Elevation of instruments: Barometer above sea level	Thermometer above ground	Anemometer above ground	Pressure: Station	Sea level	Departure from normal	Temperature of the air: Mean	Departure from normal	Maximum	Date	Mean maximum	Minimum	Date	Mean minimum	Greatest daily range	Total degree days	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Departure from normal	Greatest in 24 hours	Days with 0.01 inch or more	Wind: Average hourly velocity	Prevailing direction	Maximum velocity: Miles per hour	Direction	Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
NEW ENGLAND	*Ft.*	*Ft.*	*Ft.*	*Mb.*	*Mb.*	*Mb.*	°F.	°F.	°F.		°F.	°F.		°F.	°F.		°F.	%	*In.*	*In.*	*In.*		*Mi.*								*0–10*	*In.*	*In.*	
							42.7	−0.3										73	3.89	+0.8											6.8			
Eastport	75	67	85	1,015.2	1,018.3	+4.4	37.8	−1.2	55	11	45	20	29	31	22	812	29	73	2.05	−.8	.59	16	11.6	sw.	35	e.	16	8	5	17	6.6	6.8	0.0	3
Greenville, Maine	1,070	6	41	977.7	1,018.0	+3.1	33.0	−4.1	64	12	44	6	29	21	37	960	24	70	2.30	−.6	.99	16	6.1	nw.	25		28	5	7	18		16.9	.6	0
Portland, Maine [1]	103	5	43	1,014.6	1,018.3	+3.4	41.2	+1.1	77	11	52	19	1	31	38	711	31	71	2.69	−.7	.78	10	10.3	s.	31	w.	27	7	7	16	6.6	1.1	.0	0
Concord [1]	289	4	45	1,007.8	1,018.6	+3.7	41.5	−.1	75	11	53	16	22	30	40	705	30	67	2.98	+.2	.62	15	8.3	nw.	30	nw.	27	5	8	17	7.1	5.8	.0	0
Burlington [1]	403	6	51	1,002.4	1,017.6	+2.7	40.6	−2.7	71	11	51	20	4	30	32	734	30	70	1.39	−.8	.65	10	11.9	s.	43	s.	11	4	6	20	7.2	3.3	.0	0
Boston [1]	124	33	62	1,014.2	1,018.6	+3.7	47.2	+.8	75	12	56	30	28	39	33	537	34	65	4.15	+.8	1.34	13	13.8	sw.	40	sw.	27	8	6	16	6.7	.6	.0	0
Nantucket [1]	12	4	34	1,019.0	1,019.6	+5.0	43.4	.0	58	15	50	25	1	37	22	649	39	86	6.07	+3.1	1.90	14	16.2	sw.	41	se.	16	7	5	18	6.9	.6	T	1
Block Island	26	11	46	1,018.3	1,019.3	+4.4	44.5	+.5	58	30	50	32	4	39	18	618	40	89	6.86	+2.3	1.81	13	17.0	sw.	44	ne.	3	8	7	15	6.6	T	.0	1
Providence [1]	159	46	60	1,013.2	1,019.3	+4.1	48.0	+1.4	73	12	57	30	4	39	29	509	35	72	4.91	+1.7	1.41	12	11.3	sw.	51	sw.	27	5	13	12	6.6	.4	.0	1
Hartford [1]	159	5	44	1,013.2	1,019.3	+4.1	46.4	−.3	78	12	57	23	1	36	36	557	35	70	5.30	+1.8	1.66	13	10.6	s.	40	s.	27	5	11	14	6.9	.7	.0	1
New Haven [1]	107	5	39	1,015.6	1,019.6	+4.0	46.2	+1.3	70	12	55	25	1	38	25	566	36	72	5.21	+2.0	2.02	13	8.5	sw.	26	e.	16	6	7	17	6.7	T	.0	1
MIDDLE ATLANTIC							52.7	+1.5										70	4.26	+1.3										6.5			
Albany [1]	97	26	40	1,014.9	1,018.3	+2.7	43.4	−1.0	78	6	54	20	1	33	38	650	32	68	3.33	+1.2	.94	13	11.2	w.	40	w.	18	4	9	17	7.2	7.4	.0	1
Binghamton [2]	871	60	79	987.1	1,018.3	+2.7	45.8	+1.6	75	30	56	24	4	35	39	576	34	66	4.74	+2.3	1.88	13	7.4	w.	30	sw.	6	4	7	19	7.4	.5	.0	1
New York	314	415	454	1,007.5	1,019.0	+3.4	49.8	+.4	76	6	58	34	1	41	35	393	39	68	3.13	+.4	1.01	14	9.5	se.	31	sw.	6	4	9	17	7.1	.0	.0	1
Harrisburg [1]	374	30	49	1,005.1	1,018.6	+2.7	52.1	+1.2	80	6	63	32	4	41	35	393	39	68	3.13	+.4	1.01	14	9.5	se.	31	sw.	6	4	9	17	7.1	.0	.0	1
Philadelphia [1]	114	5	57	1,014.9	1,019.0	+2.7	53.6	+1.5	81	6	63	35	22	44	30	254	41	71	6.76	+3.7	4.06	12	9.4	s.	23	w.	7	6	13	11	6.2	.0	.0	1
Reading	323	47	306	1,007.1	1,019.3	+3.4	52.4	+1.6	82	6	63	33	1	42	34	389			4.62	+1.4	1.46	12	12.6	se.	42	se.	16	9	10	11	6.2	.0	.0	1
Scranton	805	72	104	989.2	1,019.0	+3.1	47.6	−.5	78	30	57	30	28	38	38	522			6.64	+3.9	2.54	16	7.5	n.	26	nw.	27	6	8	16	6.5	.0	.0	1
Atlantic City	52	37	172	1,017.6	1,019.6	+3.7	48.8	+1.0	67	7	54	36	4	43	23	451	42	81	4.16	+1.2	1.27	13	17.9	s.	49	ne.	21	6	9	15	6.5	.0	.0	1
Trenton	190	89	107	1,012.2	1,019.3	+3.7	51.8	+2.0	79	6	62	33	1	42	32	408			4.63	+1.7	1.88	11	10.8	s.	30	s.	27	6	11	13	6.4	T	.0	1
Baltimore [3]	123	100	215	1,014.6	1,019.3	+3.4	55.8	+2.2	85	6	66	37	1	46	34	302	41	68	5.56	+2.2	3.64	8	11.9	s.	35	sw.	5	6	12	12	6.1	.0	.0	2
Washington [3]	112	56	100	1,014.9	1,019.0	+3.1	57.4	+4.1	89	6	69	37	4	46	34	255	42	62	3.37	+0.1	1.13	12	9.1	s.	29	w.	6	6	8	16	6.7	.0	.0	2
Cape Henry	18	8	54	1,018.6	1,019.3	+3.0	57.8	+3.2	89	6	67	37	1	49	36	246	48	76	3.46	+.2	.80	8	12.8	s.	34	n.	26	9	7	14	6.2	.0	.0	2
Lynchburg [1]	686	4	50	993.9	1,018.6	+2.3	57.4	+1.8	83	6	69	33	18	46	40	244	44	68	2.93	−.6	1.09	9	9.8	s.	29	s.	20	6	8	16	6.4	.0	.0	1
Norfolk [3]	91	80	125	1,016.6	1,020.0	+3.4	59.0	+2.2	86	6	68	40	1	49	34	216	48	74	2.92	−.3	.75	11	11.6	ne.	25	s.	11	8	7	15	6.8	.0	.0	1
Richmond [3]	144	11	52	1,013.2	1,018.6	+2.3	58.2	+1.6	84	20	70	33	4	47	36	229	45	70	2.20	−1.3	.72	10	9.4	s.	27	s.	30	6	12	12	6.0	.0	.0	1
SOUTH ATLANTIC							64.6	+3.4										77	3.72	+0.6										6.5			
Asheville	2,253	77	92	939.4	1,018.3	+1.7	58.8	+4.9	80	25	70	32	18	48	39	100	46	72	2.42	−.6	1.04	12	9.6	se.	28	se.	30	4	11	15	6.6	.0	.0	2
Charlotte [3]	779	63	86	990.9	1,019.0	+2.4	63.2	+3.4	85	25	73	40	18	53	32	103	49	69	2.20	−1.1	.59	13	7.8	sw.	25	s.	11	4	9	17	7.0	.0	.0	2
Greensboro [1]	886	6	56	987.5	1,019.3	+2.4	60.2	+3.9	84	25	72	32	18	48	40	175	48	72	2.65	−.9	.68	10	9.4	sw.	26	s.	11	4	7	19	7.1	.0	.0	2
Hatteras	11	5	50	1,019.3	1,019.6	+3.3	60.1	+.3	74	7	66	46	28	54	19	157	56	90	3.64	+.1	1.34	7	13.6	sw.	32	sw.	9	6	7	17	7.0	.0	.0	3
Raleigh [3]	376	5	69	1,005.4	1,019.0	+2.4	62.1	+2.7	86	25	73	37	1	51	35	136	50	76	3.08	−.4	.95	10	8.5	sw.	28	sw.	6	5	10	15	6.4	.0	.0	5
Wilmington	72	73	107	1,017.3	1,019.6	+2.7	63.7	+1.7	85	7	72	42	1	55	27	84	56	81	3.72	+1.1	.99	9	11.0	s.	28	sw.	6	10	8	12	5.6	.0	.0	4
Charleston [3]	48	11	92	1,017.3	1,019.0	+2.1	67.2	+2.7	83	7	74	52	18	60	21	35	58	84	4.37	+1.8	1.61	11	11.2	s.	27	s.	30	ne.	10	5	13	12	6.0	.0	.0	6
Columbia, S. C. [3]	347	70	91	1,006.1	1,018.6	+1.7	67.2	+3.9	88	25	78	43	18	56	32	40	54	70	5.18	+2.3	1.22	10	9.2	s.	27	s.	30	ne.	10	5	13	12	6.0	.0	.0	2
Greenville, S. C. [3]	1,040	18	36	981.4	1,018.6	+2.0	62.9	+4.3	83	25	73	38	18	53	33	100	48	69	2.58	−1.1	1.02	14	10.1	ne.	34	n.	26	4	6	20	7.3	.0	.0	2
Augusta [3]	182	62	77	1,011.9	1,018.3	+2.0	67.8	+3.6	88	25	79	42	18	57	33	32	54	71	6.23	+3.1	2.05	11	6.5	s.	19	s.	11	4	12	14	6.3	.0	.0	6
Savannah [1]	65	73	152	1,016.6	1,019.0	+2.1	69.2	+4.9	90	9	78	47	19	60	31	25	62	85	4.29	+1.7	1.56	9	10.4	se.	33	sw.	30	3	13	14	6.8	.0	.0	7
Jacksonville [3]	43	86	110	1,017.3	1,018.6	+1.3	73.0	+4.3	90	6	81	52	19	65	27	7	64	82	4.22	+1.8	1.48	13	8.4	s.	30	sw.	16	6	6	18	6.9	.0	.0	7
FLORIDA PENINSULA							77.8	+4.3										79	3.58	+1.3										5.1			
Key West [3]	21	10	64	1,016.3	1,016.9	+1.0	80.3	+4.6	89	17	85	72	17	76	17	0	70	78	1.17	−.1	.46	8	9.5	e.	36	nw.	17	10	18	2	4.4	.0	.0	1
Miami [3]	25	242	249	1,016.9	1,018.0	+1.1	76.4	+2.5	83	17	80	66	2	73	15	0	69	80	6.02	+2.6	4.09	7	13.9	se.	38	se.	13	10	12	8	5.1	.0	.0	6
Tampa [1]	35	6	43	1,016.9	1,018.0	+1.1	76.6	+5.7	90	7	86	61	1	67	26	0	66	80	3.54	+1.5	1.75	7	8.3	se.	28	sw.	16	6	16	8	5.8	.0	.0	7
EAST GULF							66.8	+2.2										79	7.16	+2.9										7.1			
Atlanta [1]	1,173	33	72	976.6	1,018.0	+1.4	63.4	+2.3	84	8	74	39	18	53	33	84	50	70	5.24	+1.5	1.53	12	11.0	nw.	35	s.	11	3	8	19	7.3	.0	.0	2
Macon [3]	370	79	87	1,004.7	1,018.0	+1.4	67.1	+3.2	86	5	78	41	18	56	34	39	54	70	4.07	+.9	1.36	9	6.8	nw.	27	nw.	11	3	10	17	7.4	.0	.0	7
Apalachicola	35	11	51	1,016.6	1,018.0	+1.1	70.0	+2.9	85	26	76	53	18	64	23	9	64	86	6.36	+3.6	2.43	9	8.3	se.	29	n.	23	6	11	13	6.4	.0	.0	9
Pensacola [3]	56	54	79	1,015.9	1,018.0	+1.1	69.3	+2.6	82	27	76	49	18	62	23	15	62	82	7.59	+3.6	2.57	8	7.9	se.	26	nw.	20	5	11	14	6.3	.0	.0	6
Anniston	741	9					64.3	+3.1	88	8	76	36	18	53	39	70			6.26	+1.9	2.20	11							4	14	12			.0	7
Birmingham [1]	700	5	62	992.9	1,018.0	+1.1	63.8	+2.1	87	8	74	37	18	53	35	84	52	74	7.28	+2.5	2.00	11	8.8	se.	33	se.	1	3	6	21	7.4	.0	.0	8
Mobile [3]	57	86	161	1,015.6	1,017.3	+0.7	69.4	+3.1	83	7	78	47	18	61	25	13	61	84	9.49	+4.9	3.83	13	8.1	s.	30	n.	1	3	12	15	7.1	.0	.0	5
Montgomery [3]	218	92	105	1,009.8	1,018.0	+1.1	66.6	+1.3	88	8	75	45	18	58	31	37	57	80	7.09	+2.8	1.65	15	7.1	e.	30	e.	1	3	10	17	7.3	.0	.0	5
Meridian [3]	375	67	92	1,003.7	1,017.3	+1.0	65.3	+1.3	85	5	75	39	18	56	34	66	56	80	8.31	+3.5	1.81	14	6.5	s.	34	se.	1	5	4	21	7.4	.0	.0	10
Vicksburg [3]	247	82	102	1,007.5	1,016.3	.0	66.1	+.5	85	4	75	47	17	57	29	51	57	84	8.12	+2.9	2.83	14	9.1	se.	30	s.	5	4	4	22	7.6	.0	.0	9
New Orleans [4]	53	50	84	1,014.6	1,016.6	+.3	70.0	.....	84	9	78	48	18	62	27	9	64	82	9.01	+3.8	2.57	9	6.9	se.	20	s.	1	5	6	19	7.2	.0	.0	6
WEST GULF							67.4	+4.6										76	2.89	−0.1										8.0			
Shreveport [1]	249	5	64	1,006.1	1,014.9	−.3	67.1	+2.3	87	30	77	41	17	58	32	48	56	75	6.40	+1.8	4.17	12	10.8	s.	37	s.	4	4	7	19	7.3	.0	.0	10
Fort Smith [1]	463	57	82	997.6	1,013.9	.0	61.2	−.6	85	30	73	35	17	50	37	144	50	70	5.88	+1.9	1.29	14	9.3	e.	38	n.	8	7	8	15	6.3	.0	.0	14
Little Rock [1]	357	26	58	1,006.1	1,015.6	+.7	62.4	+.3	83	30	72	38	17	53	35	117	48	66	6.10	+2.1	2.28	11	10.0	sw.	36	sw.	19	5	8	17	6.8	.0	.0	8
Austin [1]	605	10	41	992.6	1,014.2	+.7	66.1	−1.7	86	30	76	39	17	57	38	91	56	76	2.24	−2.1	1.38	13	11.0	s.	30	se.	9	6	5	19	6.9	.0	.0	4
Brownsville [1]	57	5	54	1,009.8	1,011.9	−.6	74.4	+.7	88	7	83	48	6	66	32	8	66	84	1.44	−.3	.93	4	13.5	se.	35	se.	4	2	11	16	7.3	.0	.0	3
Corpus Christi [1]	20	4	33	1,012.5	1,013.5	.0	71.2	+2.2	89	5	80	50	14	63	36	22	64	83	1.48	.....	.84	6	14.2	se.	35	se.	29	0	7	17	6.7	.0	.0	3
Dallas [1]	512	5	45	995.3	1,013.9	.0	65.4	+.3	93	30	76	36	17	55	33	95	54	72	3.81	−.4	1.41	12	13.5	s.	43	w.	10	7	7	16	6.4	.0	.0	8
Fort Worth [1]	679	40	56	989.5	1,013.5	.0	65.0	+.9	93	30	76	37	17	54	34	104	52	71	2.98	−1.0	1.10	11	13.9	s.	41	w.	5	8	9	13	6.2	.0	.0	7
Galveston [3]	54	106	114	1,013.2	1,014.9	−.3	68.4	−.3	80	5	73	52	17	64	20	18	64	90	1.24	−1.8	.49	7	13.3	se.	31	w.	11	8	7	15	7.2	.0	.0	4
Houston [3]	138	157	190	1,009.8	1,014.9	.0	69.8	+.5	85	30	78	43	17	61	28	33	60	80	1.19	−2.4	.60	13	12.6	se.	38	se.	12	7	4	19	6.7	.0	.0	4
Palestine	510	64	72	997.0	1,015.2	−.3	66.8	+.8	87	30	76	41	17	58	32	69	54	70	1.91	−2.5	.87	11	9.0	s.	28	s.	4	6	8	16	6.7	.0	.0	2
Port Arthur [3]	34	59	134	1,013.9	1,015.2	.0	70.0	+1.5	82	24	77	47	17	63	22	16	62	82	2.56	−.4	1.57	8	14.4	s.	34	s.	4	8	5	17	6.5	.0	.0	3
San Antonio [1]	693	8	51	955.8	1,010.2	−3.0	68.2	−.9	89	9	79	37	17	57	44	61	56	72	.30	−2.9	.22	6	10.8	se.	32	nw.	5	7	5	18	6.6	.0	.0	1

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR APRIL 1947—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station	Pressure: Sea level	Pressure: Departure from normal	Temperature of the air: Mean	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Total degree days	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Greatest in 24 hours	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
OHIO VALLEY AND TENNESSEE	*Ft.*	*Ft.*	*Ft.*	*Mb.*	*Mb.*	*Mb.*	*° F.*	*° F.*	*° F.*		*° F.*	*° F.*		*° F.*	*° F.*		*° F.*	%	*In.*	*In.*	*In.*		*Mi.*								*0–10*	*In.*	*In.*	
Chattanooga [1]	762	6	66	990.2	1,018.0	+1.4	62.0	+4.4	82	5	74	34	18	50	40	109	50	72	3.33	−1.5	.97	10	8.6	s.	33	nw.	5	6	4	20	7.0	.0	.0	6
Knoxville [1]	995	27	53	982.1	1,018.0	+1.7	61.9	+4.6	82	20	74	36	18	50	36	115	48	68	2.42	−1.7	.80	12	9.5	sw.	47	w.	11	5	6	19	7.2	.0	.0	1
Memphis [4]	399	5	86	1,001.7	1,015.9	.0	62.8	+1.0	85	10	73	37	17	53	33	107	52	72	4.56	−.21	1.62	15	8.8	s.	30	s.	5	7	8	15	6.3	.0	.0	11
Nashville [1]	546	5	72	997.3	1,016.9	+.3	61.0	+2.0	84	5	72	38	3	50	36	146	48	70	3.56	−.6	.94	12	10.4	s.	35	sw.	5	6	7	17	6.7	.0	.0	7
Lexington [1]	989	4	28	980.7	1,017.3	+.7	55.2	+.9	78	23	66	34	26	45	31	296	46	75	4.83	+1.3	1.41	14	----	s.	----	----	----	5	10	15	6.7	.0	.0	3
Louisville [1]	525	106	120	997.6	1,016.6	+.3	57.0	+2.2	83	5	67	34	17	47	32	252	46	72	6.26	+2.4	1.55	15	10.0	n.	38	s.	5	6	6	18	7.0	.0	.0	6
Evansville [1]	431	11	40	1,000.7	1,015.9	.0	56.0	+1.1	84	10	67	33	17	45	34	285	46	74	5.48	+1.6	1.58	14	10.7	s.	43	s.	5	7	4	19	7.0	.0	.0	8
Indianapolis [1]	823	5	54	985.4	1,015.6	−.3	50.6	−.2	79	10	61	30	13	40	31	433	42	76	5.82	----	1.56	13	13.1	ne.	46	w.	5	4	8	18	7.1	T	.0	7
Terre Haute [2]	575	68	149	995.6	1,016.6	+1.4	52.4	−.1	79	10	63	31	17	42	36	380	44	77	5.95	+2.3	1.58	13	12.8	s.	45	s.	5	6	7	17	6.8	.0	.0	8
Cincinnati [3]	627	11	51	993.9	1,016.9	+.3	55.4	+3.0	82	5	65	34	13	46	33	294	43	76	8.37	+5.2	1.17	15	5.2	se.	17	se.	5	4	10	16	6.7	.0	.0	5
Columbus [3]	822	90	110	987.1	1,016.9	+1.0	52.0	+.8	82	5	62	32	13	42	31	392	42	77	5.30	+2.4	1.53	15	11.8	s.	49	sw.	11	6	6	18	6.9	.0	.0	5
Dayton [1]	1,003	6	55	980.4	1,016.9	+1.0	49.7	−.8	79	5	60	28	17	39	32	463	41	78	6.69	+3.5	1.96	14	13.9	ne.	50	w.	5	5	10	15	7.0	T	.0	4
Elkins [1]	1,947	4	45	948.5	1,018.0	+1.1	52.8	+5.4	83	20	67	23	8	38	52	371	40	69	2.58	−1.0	.76	12	9.4	s.	34	w.	6	6	7	17	6.8	.0	.0	2
Parkersburg	637	77	84	994.2	1,017.6	+1.0	56.3	+2.9	85	5	68	30	8	44	45	273	40	62	3.38	+.2	1.09	16	7.8	nw.	25	nw.	29	4	10	16	7.0	.0	.0	2
Pittsburgh [1]	842	39	54	986.5	1,017.3	+.7	52.0	+2.8	82	5	64	30	8	40	39	394	38	65	2.51	−.4	1.22	14	12.4	sw.	36	w.	6	3	7	20	7.4	T	.0	1
LOWER LAKES																																		
Buffalo [1]	768	34	96	988.8	1,017.6	+2.0	43.4	−.4	75	11	53	24	28	34	33	650	34	74	3.95	+1.4	1.19	17	15.6	sw.	47	sw.	27	2	6	22	7.9	4.0	.0	2
Canton	448	10	61	1,001.0	1,017.3	+2.7	40.2	−1.7	72	11	50	21	4	30	36	744	29	66	2.38	+.2	.83	14	10.3	w.	30	w.	6	3	11	16	7.2	2.2	.0	0
Oswego	335	71	85	1,005.4	1,018.0	+2.8	43.0	+.4	74	11	51	23	4	35	32	662	32	67	2.94	+.6	.59	15	10.6	w.	25	se.	11	4	9	17	7.2	2.9	.0	0
Rochester [1]	523	5	69	998.3	1,018.0	+2.1	44.5	+1.0	77	11	54	25	4	34	40	619	34	70	4.34	+2.0	1.28	14	12.4	w.	40	w.	24	2	9	19	7.5	5.3	.0	0
Syracuse [1]	596	5	57	995.9	1,018.3	+2.7	44.7	+1.7	75	11	55	20	4	34	36	610	34	69	3.20	+.7	.97	15	12.1	sw.	38	s.	11	2	7	21	7.7	5.3	.0	0
Erie [2]	714	57	81	991.2	1,017.6	+2.0	45.2	+.1	78	23	54	29	5	36	32	593	36	76	8.88	+6.2	3.16	18	10.4	ne.	31	sw.	6	4	11	15	7.0	T	.0	4
Cleveland [1]	762	27	54	988.8	1,016.9	+1.3	46.8	+.6	79	5	57	25	28	37	37	547	38	74	4.38	+1.0	1.08	17	13.3	ne.	46	w.	6	4	7	19	7.3	T	.0	2
Sandusky	629	5	67	993.6	1,016.9	+.3	47.0	−.2	80	5	56	31	17	38	36	543	----	----	3.54	+1.0	.80	16	11.9	sw.	40	sw.	6	5	7	18	7.2	T	.0	4
Toledo [1]	628	5	47	993.2	1,016.6	+.7	45.8	−.4	76	5	55	28	14	36	36	577	37	74	4.24	+1.6	1.33	14	14.8	sw.	47	sw.	6	2	8	20	7.8	1.5	.0	5
Fort Wayne [1]	857	5	33	984.8	1,016.3	+.4	46.9	−1.8	75	10	57	28	3	37	32	544	38	76	5.70	+2.6	1.40	15	12.0	ne.	44	sw.	6	3	9	18	7.4	.4	.0	7
Detroit [1]	730	5	78	989.8	1,016.6	+.7	44.7	−.9	73	23	54	27	3	36	32	609	35	72	6.89	+4.4	2.94	17	11.0	ne.	37	nw.	6	3	9	18	7.5	3.3	.0	2
UPPER LAKES																																		
Alpena	609	5	89	993.6	1,016.3	+.4	39.7	−1.6																										
Escanaba	612	51	72	-------	1,016.3	.0	37.8	−.8	77	29	45	22	19	30	34	818	30	75	4.58	+2.1											6.8			
Grand Rapids [2]	707	70	244	989.8	1,015.9	.0	36.1	−1.8	57	29	43	19	13	29	20	867	29	76	2.98	+.7	.92	15	11.5	nw.	30	nw.	27	2	11	17	7.3	1.4	.0	3
Lansing [3]	878	5	90	984.1	1,016.6	+1.0	45.5	−1.5	72	23	54	27	13	37	26	584	34	73	3.15	+.9	1.65	12	10.5	s.	33	n.	12	5	14	8	5.9	.1	.0	1
Marquette	734	44	73	988.2	1,015.9	−.7	43.8	−1.8	73	23	54	25	3	34	32	633	34	72	6.39	+3.8	2.62	16	13.2	sw.	60	sw.	5	4	8	18	7.2	3.0	.0	7
Sault Sainte Marie [1]	734	44	73	988.2	1,015.9	−.7	34.2	−3.6	76	29	41	15	13	27	34	922	26	73	5.28	+2.8	2.43	13	8.0	n.	26	sw.	28	5	12	13	6.5	12.2	.0	1
Chicago [1]	614	11	52	993.2	1,016.6	+.3	33.2	−3.3	61	29	41	17	13	25	28	956	26	77	3.23	+1.1	1.33	13	11.8	e.	34	w.	18	4	9	17	6.8	1.9	.0	1
Green Bay	673	5	36	990.9	1,015.6	−.3	46.6	−.3	77	23	56	30	28	38	35	549	37	74	8.33	+5.8	4.08	16	11.6	s.	40	sw.	5	2	12	16	7.3	.1	.0	5
Milwaukee [1]	617	5	32	992.6	1,015.6	+.4	40.8	−2.4	70	29	50	24	3	32	30	727	31	72	3.25	+.6	1.43	12	9.3	n.	33	sw.	5	4	8	18	7.2	.2	.0	3
Duluth [2]	681	33	66	990.2	1,015.6	.0	42.8	+.6	69	26	51	28	12	35	32	665	36	79	3.68	+1.0	1.06	15	14.7	ne.	60	sw.	5	2	10	18	7.4	.9	.0	3
	1,133	5	47	973.6	1,015.6	−.3	36.1	−.9	73	29	44	18	12	29	28	866	27	78	3.07	+1.0	1.05	13	13.1	ne.	43	ne.	5	12	6	12	8.5	10.3	.0	0
NORTH DAKOTA																																		
Fargo [1]	940	6	47	980.7	1,015.6	+3.1	40.1	0.0																							7.1			
Bismarck [1]	1,677	5	43	954.3	1,015.9	+.3	39.5	−1.1	82	28	48	18	7	31	40	767	32	74	1.78	+0.1											6.8	7.5	.0	1
Devils Lake	1,478	11	44	961.4	1,015.9	.0	41.4	+1.0	84	28	52	15	8	31	42	708	32	80	3.69	+1.5	1.25	11	13.1	n.	41	n.	5	5	9	16	6.8	7.5	.0	1
Grand Forks [1]	832	4	41	985.1	1,016.3	+.7	39.6	+.8	85	28	50	16	6	29	45	760	29	73	3.15	+.9	1.65	8	11.3	nw.	36	nw.	26	4	7	19	7.6	10.2	.0	0
Williston	1,878	42	50	946.8	1,014.9	−.3	38.6	-------	84	28	48	20	7	29	48	795	31	78	2.02	-------	.50	12	----	s.	----	----	----	4	10	16	----	2.1	.0	0
	1,878	42	50	946.8	1,014.9	−.3	41.2	−.8	83	28	52	8	7	31	40	711	29	70	.70	−.8	.17	10	9.7	nw.	34	ne.	5	6	8	16	7.0	3.1	.0	0
																		67	1.59	+.4	1.06	11	8.1	nw.	28	nw.	30	5	8	17	6.9	10.6	.0	1
UPPER MISSISSIPPI																																		
Minneapolis-St. Paul [1]	919	43	74	980.4	1,014.6	+.4	48.8	−1.2																							7.2			
La Crosse [1]	714	5	29	988.2	1,014.9	.0	42.1	−4.3	81	30	50	26	12	34	38	685	33	73	2.44	+.2	.40	15	11.3	nw.	34	w.	26	2	8	20	7.8	2.0	.0	2
Madison [3]	974	70	78	979.3	1,014.9	−.7	42.8	−2.8	76	30	52	26	12	34	34	663	34	76	3.38	+1.0	.79	16	9.4	nw.	34	sw.	6	4	7	19	7.4	2.7	.0	5
Charles City	1,055	10	51	978.0	1,015.2	.0	44.1	−1.0	82	30	55	26	12	34	33	617	36	76	4.86	+2.1	1.87	16	12.9	sw.	54	sw.	5	3	8	19	7.6	2.2	.0	5
Moline [1]	606	6	50	992.9	1,015.2	−.3	44.6	−4.3	81	30	53	27	12	35	35	629	----	----	3.63	+1.1	1.16	12	7.6	nw.	27	sw.	5	8	5	17	6.9	.8	.0	5
Dubuque	699	60	79	989.5	1,014.9	−.3	48.8	.0	77	30	59	31	18	39	39	487	38	72	7.36	+4.7	2.56	13	12.8	w.	52	sw.	5	6	5	19	7.3	T	.0	7
Burlington [1]	702	4	36	989.2	1,014.9	−.3	47.0	−1.6	79	30	56	30	12	38	32	544	38	72	6.84	+4.0	2.48	11	6.8	se.	34	sw.	6	5	7	18	7.1	3.0	.0	5
Cairo	357	5	99	1,003.1	1,015.9	+1.0	49.8	−1.0	84	30	60	30	7	39	42	459	40	78	6.40	+3.2	2.99	13	12.6	ne.	52	w.	5	5	7	18	7.2	3.4	.0	7
Peoria [1]	609	6	28	993.9	1,016.3	+.7	49.8	−.1	77	23	60	31	7	40	39	456	40	75	8.66	+5.3	3.39	12	12.4	e.	54	sw.	5	5	4	21	7.5	T	.0	6
Springfield, Ill [1]	636	5	191	992.2	1,015.9	+1.0	52.5	−.2	80	23	62	34	13	43	34	380	42	77	5.18	+1.7	1.20	14	13.4	s.	43	s.	5	6	5	19	6.9	.0	.0	8
St. Louis [2]	568	35	303	994.6	1,015.2	.0	55.9	−.2	85	23	65	37	16	47	26	----	----	72	6.18	+2.4	2.07	14	13.8	s.	49	sw.	10	8	5	17	----	.0	.0	5
MISSOURI VALLEY																																		
Columbia, Mo. [1]	784	6	66	986.5	1,014.9	+.3	50.1	−1.3																							6.9			
Kansas City [1]	963	39	76	979.7	1,014.9	+.3	54.0	−.8	83	30	64	33	2	44	34	346	42	74	5.28	+2.4											5.8	.0	.0	11
St. Joseph [2]	967	11	49	979.7	1,014.6	+.4	54.0	−.5	85	30	64	34	16	44	30	342	42	71	6.45	+2.7	1.79	14	9.2	sw.	35	sw.	5	11	9	10	5.8	.0	.0	11
Springfield, Mo. [1]	1,324	5	67	967.2	1,014.9	−1.0	53.0	−.5	85	30	63	32	16	43	30	371	42	74	7.76	+4.2	2.27	19	12.4	n.	44	sw.	5	6	7	17	6.8	T	.0	9
Topeka [2]	987	65	87	967.2	1,014.9	−.7	55.9	−1.1	87	23	67	31	17	45	39	287	44	72	5.54	+2.4	1.20	18	9.9	e.	34	w.	5	11	9	10	5.1	T	.0	7
Lincoln [2]	978.7	65	87	978.7	1,014.6	+.7	53.6	−1.1	89	30	64	31	15	43	35	356	43	76	7.38	+3.5	3.00	13	14.8	s.	52	sw.	5	5	8	17	6.9	T	.0	8
Omaha [1]	1,189	11	81	971.6	1,014.9	+.7	49.2	−2.3	81	30	59	28	16	40	34	472	40	77	5.45	+2.9	1.65	12	10.6	n.	39	w.	6	6	4	20	7.3	.2	.0	9
Valentine	1,105	5	68	974.6	1,015.2	+.6	48.6	−2.4	80	30	58	28	7	39	31	495	38	74	6.31	+3.8	2.53	12	12.7	nw.	35	w.	5	5	4	21	7.3	T	.0	5
Sioux City [1]	2,598	46	54	922.5	1,014.9	+.3	44.1	−1.6	77	29	55	24	16	33	41	624	32	69	1.76	−.1	.54	12	9.9	n.	36	nw.	5	6	8	16	7.1	3.4	.0	4
Huron [1]	1,378	5	40	973.2	1,014.9	+.3	45.9	−1.3	78	28	57	24	20	35	42	573	36	76	3.47	+.8	1.10	11	11.4	nw.	46	w.	5	4	6	20	7.6	1.9	.0	3
	1,301	5	41	967.8	1,015.6	+.4	42.4	−2.7	81	29	52	21	7	33	37	677	35	81	2.75	+.5	1.17	17	13.4	nw.	45	nw.	6	2	9	19	7.9	8.6	.0	2
NORTHERN SLOPE																																		
Billings [1]	3,570	16	40	890.6	1,015.2	.0	44.1	+0.2																							7.2			
Havre	2,507	11	67	926.2	1,015.9	+1.0	45.5	−.5	77	28	56	20	7	34	38	586	32	66	1.24	-------	.39	13	12.2	sw.	56	nw.	30	2	9	19	7.5	3.9	.0	2
Helena [1]	4,124	5	43	873.7	1,017.3	+2.4	46.6	+2.9	81	28	58	19	6	36	38	552	30	60	.85	−.1	.31	12	9.6	sw.	33	nw.	30	1	9	20	7.7	3.1	.0	1
Missoula [1]	3,205	4	32	903.2	1,018.3	+3.4	44.3	+.8	75	27	55	21	16	33	43	622	30	62	.81	−.3	.30	9	10.1	w.	42	n.	14	3	10	17	7.1	1.3	.0	0
Kalispell	2,973	48	56	912.3	1,016.3	+1.7	45.6	+1.7	78	27	58	26	8	34	42	584	30	61	.38	−.5	.10	10	7.0	w.	36	n.	14	3	11	16	7.2	T	.0	0
Miles City [1]	2,973	48	56	912.3	1,016.3	+1.7	45.6	+2.0	75	27	56	28	8	35	36	586	31	60	.65	−.2	.15	9	6.3	w.	34	ne.	14	2	11	17	7.1	.8	.0	0
Rapid City [1]	2,371	5	78	930.9	1,016.3	+.4	43.6	-------	85	28	55	16	8	32	40	636	32	70	1.84	-------	1.36	8	----	w.	----	----	----	4	8	18	7.5	12.1	.0	1
Cheyenne [1]	3,259	5	63	900.1	1,015.2	−.4	43.3	−.8	76	29	55	19	7	31	45	653	32	69	1.47	.0	.62	10	14.6	nw.	61	nw.	5	5	11	14	6.7	5.6	.0	0
Lander [1]	6,094	5	40	810.7	1,014.2	+.7	40.0	−.9	70	20	52	18	16	28	40	750	26	64	1.55	−.4	.37	13	12.4	nw.	40	nw.	30	2	11	17	7.0	6.7	.0	3
Sheridan [1]	5,352	60	68	834.1	1,015.9	+2.0	40.8	−1.6	71	14	52	16	5	29	35	724	26	62	2.80	+.7	.71	9	7.4	sw.	30	w.	17	3	14	13	6.7	17.7	.0	2
	3,790	5	38	883.5	1,016.3	+1.4	43.0	−.3	75	14	55	20	6	31	42	660	28	64	1.89	.0	.48	14	9.7	nw.	46	nw.	30	4	11	15	7.1	4.9	.0	0
North Platte [2]	2,821	11	51	915.0	1,014.6	+.4	47.1	−1.5	77	29	59	25	16	35	42	537	34	72	1.94	−.1	.51	13	8.5	n.	26	w.	30	2	9	19	7.4	5.4	.0	6

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR APRIL 1947—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station	Pressure: Sea level	Pressure: Departure from normal	Temperature of the air: Mean	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Total degree days	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Greatest in 24 hours	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
MIDDLE SLOPE	*Ft.*	*Ft.*	*Ft.*	*Mb.*	*Mb.*	*Mb.*	° *F.*	° *F.*	°*F.*		°*F.*	° *F.*		° *F.*	° *F.*		° *F.*	%	*In.*	*In.*	*In.*		*Mi.*								*0–10*	*In.*	*In.*	
							52.5	−1.6										70	5.19	+2.6											6.7			
Denver [1]	5,292	106	113	835.8	1,013.2	+.7	46.8	−.3	75	20	57	27	15	36	32	549	28	58	1.33	−.7	.44	12	8.4	n.	38	n.	15	2	17	11	6.6	2.5	.0	1
Pueblo [1]	4,690	5	36	854.4	1,012.9	+1.0	49.2	−.2	82	30	64	25	17	35	51	473	30	57	1.25	−.1	1.00	8	10.1	nw.	42	n.	10	3	17	10	6.3	2.5	.0	1
Concordia	1,302	50	58	964.4	1,014.9	+.7	50.3	−3.3	83	30	60	30	16	40	36	444	40	74	3.85	+1.8	1.98	12	8.6	n.	26	nw.	5	6	9	15	6.7	.8	.0	6
Dodge City [1]	2,509	5	58	925.2	1,013.2	−.3	50.3	−3.3	83	30	61	30	16	39	38	445	40	74	3.59	+1.6	1.66	10	16.5	se.	43	nw.	5	5	6	19	7.3	1.1	.0	3
Wichita [1]	1,358	6	64	964.4	1,012.9	−.3	53.6	−2.8	83	30	64	30	16	44	32	352	44	74	5.20	+2.3	1.72	11	17.2	se.	45	se.	10	5	9	16	7.1	T	.0	6
Oklahoma City [2]	1,214	10	47	970.2	1,013.2	.0	58.7	−1.1	87	30	69	35	16	48	33	217	49	78	11.91	+8.6	3.52	14	10.9	s.	29	w.	8	5	10	15	6.8	.0	.0	8
Tulsa [1]	674	10	60	989.2	1,013.2	.....	58.8	−.1	84	30	69	38	16	49	33	211	48	73	9.23	+5.0	2.67	13	13.9	sw.	36	s.	18	6	10	14	6.4	.0	.0	12
SOUTHERN SLOPE																																		
							61.0	−1.0										59	1.09	−0.8										5.8			
Abilene [1]	1,738	4	59	951.6	1,012.2	−3.4	63.4	+.4	93	30	76	30	17	51	39	152	48	66	1.16	−1.6	.50	8	18.1	s.	42	sw.	19	8	4	18	6.5	.0	.0	4
Amarillo [1]	3,676	5	42	884.9	1,012.6	+.4	52.8	−1.0	84	22	65	29	16	40	41	374	39	68	2.07	+.2	.66	9	16.2	n.	42	s.	9	7	7	16	6.3	6.4	.0	2
Del Rio	960	63	71	978.7	1,011.8	−2.4	69.6	−1.0	93	4	80	43	15	59	38	61	52	59	.64	−1.2	.46	3	10.5	se.	35	nw.	4	11	5	14	5.7	.0	.0	2
Roswell	3,566	75	85	891.0	1,011.9	−1.1	58.2	−2.4	89	21	73	31	17	43	48	228	30	43	.48	−.4	.39	3	10.0	s.	35	sw.	9	13	6	11	4.8	.0	.0	2
SOUTHERN PLATEAU																																		
							60.9	+0.8										33	0.04	−0.5										3.6			
El Paso [1]	3,778	29	85	884.5	1,010.8	+.6	61.4	−.9	86	22	75	37	13	48	41	148	24	27	.06	−.2	.04	2	12.8	sw.	47	sw.	4	18	8	4	3.3	.0	.0	0
Albuquerque [1]	5,314	5	48	835.4	1,009.8	−.4	54.5	+.5	81	22	69	26	13	40	46	318	24	35	.03	−.6	.02	2	13.0	nw.	50	nw.	11	13	11	6	4.7	T	.0	1
Flagstaff	6,907	36	51	789.0	1,014.9	+4.4	44.7	+1.4	74	30	61	17	23	29	45	609	19	41	.14	−1.2	.09	4	....	w.	..	.....	..	9	13	8	5.0	.8	.0	1
Phoenix [2]	1,107	39	87	972.9	1,011.5	−.4	69.2	+2.2	96	17	84	48	4	55	39	21	32	32	T	−.4	T	0	7.3	e.	25	sw.	4	18	6	6	3.4	.0	.0	0
Tucson [1]	2,555	5	39	924.5	1,011.9	+1.7	64.8	+.4	94	17	81	39	5	49	39	76	26	26	T	−.3	T	0	....	se.	..	.....	..	21	4	5	3.0	.0	.0	0
Yuma	142	9	54	1,006.4	1,011.5	+.3	71.0	+1.5	102	16	87	47	5	55	44	13	36	36	T	−.1	T	0	6.5	w.	23	w.	22	24	3	3	2.2	.0	.0	0
MIDDLE PLATEAU																																		
							48.6	+0.8										52	0.83	−0.1										5.8			
Reno [1]	4,527	20	52	863.5	1,017.6	+3.0	48.5	+2.4	83	16	66	19	4	31	53	498	26	50	.03	−.4	.03	1	8.0	w.	38	w.	27	7	10	13	5.8	T	.0	1
Winnemucca	4,339	5	56	868.9	1,016.9	+2.3	48.9	+2.2	80	16	64	22	7	34	48	484	30	52	.64	−.2	.26	9	7.8	ne.	26	w.	20	8	8	14	6.0	1.4	.0	0
Modena	5,473	10	46	831.7	1,012.5	+1.0	46.2	+.2	75	17	62	19	4	31	46	562	....	..	.57	−.3	.26	6	10.4	sw.	30	sw.	22	10	13	7	5.1	T	.0	5
Salt Lake City [1]	4,227	32	58	866.6	1,014.9	+1.7	48.6	+.7	74	14	59	30	12	38	34	495	32	58	2.32	+.6	.88	8	8.8	nw.	33	nw.	4	9	7	14	5.9	3.9	.0	2
Grand Junction [1]	4,602	60	68	858.1	1,013.5	+2.3	51.0	−1.4	78	21	64	27	12	38	37	425	28	46	.59	−.2	.16	5	9.1	nw.	42	nw.	11	3	14	13	6.1	T	.0	4
NORTHERN PLATEAU																																		
							49.7	+1.0										59	0.97	−0.2										6.0			
Baker [2]	3,471	36	54	897.4	1,019.3	+2.7	46.0	+.8	78	14	58	24	7	34	43	569	31	64	.74	−.4	.23	8	6.2	n.	24	sw.	2	7	8	15	6.3	.9	.0	3
Boise [1]	2,739	5	49	921.1	1,017.6	+2.4	49.4	+.3	78	14	62	27	4	37	36	469	32	58	.52	−.7	.20	7	10.1	nw.	37	nw.	19	7	10	13	6.0	T	.0	1
Pocatello [1]	4,478	5	31	862.9	1,016.3	+2.8	46.0	+1.1	76	14	58	26	12	33	39	572	28	56	.72	−.8	.41	9	10.8	sw.	36	w.	10	7	7	16	6.4	T	.0	0
Spokane [1]	1,929	27	42	948.5	1,018.0	+2.4	48.2	−.2	80	27	61	28	5	36	41	502	34	64	1.17	.0	.32	10	7.1	ne.	34	sw.	29	5	12	13	6.8	T	.0	1
Walla Walla	991	57	65	982.4	1,018.3	+2.4	55.1	+2.0	83	27	65	37	4	45	33	304	....	..	2.46	+1.0	.62	12	5.7	s.	26	sw.	10	12	4	14	5.5	.1	.0	0
Yakima [1]	1,076	58	67	979.0	1,018.0	+2.8	53.7	+1.9	88	14	70	30	2	38	50	343	32	52	.23	−.3	.18	4	....	nw.	..	.....	..	8	15	7	5.3	.0	.0	0
NORTH PACIFIC COAST																																		
							53.0	+3.2										73	2.09	−0.4										6.5			
North Head	211	5	55	1,012.9	1,020.7	+2.4	51.0	+3.5	81	15	56	39	4	46	30	424	43	78	3.62	−.5	.71	15	14.9	s.	49	s.	9	6	6	18	7.0	.0	.0	0
Seattle [2]	125	90	321	1,015.6	1,020.3	+3.0	54.1	+3.0	87	26	62	39	4	46	39	330	42	71	1.87	−.5	.49	14	9.8	s.	40	sw.	9	6	10	14	6.4	T	.0	1
Tacoma	104	172	201	1,013.5	1,020.7	+3.1	52.2	+3.5	81	16	60	39	4	44	34	383	....	..	2.67	−.1	.53	14	9.6	n.	35	sw.	16	8	11	11	5.9	.0	.0	0
Tatoosh Island	86	9	61	1,016.9	1,020.3	+3.4	49.0	+2.9	73	15	53	39	3	45	23	479	44	83	6.27	+.6	1.29	16	14.5	w.	45	s.	9	3	7	20	7.7	.0	.0	0
Medford [1]	1,329	29	58	972.2	1,020.0	+3.4	54.2	+2.1	92	15	69	32	21	39	51	330	38	64	.64	−.7	.32	9	....	s.	..	.....	..	3	9	7	14	5.7	.0	.0	1
Portland, Oreg. [2]	154	68	106	1,014.9	1,020.7	+3.1	55.8	+4.0	86	26	65	38	11	47	33	291	44	72	2.09	−.8	.55	16	6.1	nw.	23	s.	3	6	7	17	6.6	.0	.0	0
Roseburg	510	45	76	1,002.4	1,021.3	+3.0	54.5	+3.5	90	15	66	35	11	42	44	318	42	71	1.69	−.6	.52	16	4.0	n.	20	n.	21	9	8	13	5.9	.0	.0	0
MIDDLE PACIFIC COAST																																		
							59.2	+3.8										71	1.02	−1.0										4.6			
Eureka	60	72	88	1,019.6	1,022.0	+2.7	52.4	+2.5	78	13	58	39	6	47	27	381	46	79	1.84	−1.5	.80	10	7.7	n.	31	n.	23	12	6	12	5.5	.0	.0	0
Red Bluff [1]	353	5	26	1,001.4	1,017.3	.....	64.0	+5.0	98	14	76	42	9	52	43	116	41	50	1.94	+.2	1.25	6	7.9	nw.	23	n.	24	14	7	9	4.5	.0	.0	2
Sacramento [2]	66	92	115	1,014.6	1,016.9	+1.3	62.2	+4.1	90	15	76	40	4	49	35	129	46	64	.15	−1.4	.13	3	6.9	s.	22	nw.	11	15	10	5	3.9	.0	.0	0
San Francisco [2]	155	112	132	1,012.9	1,018.6	+1.7	58.4	+3.4	86	12	65	48	4	52	27	224	47	76	.17	−1.4	.11	4	9.5	w.	27	w.	16	13	9	8	4.3	.0	.0	0
SOUTH PACIFIC COAST																																		
							63.3	+3.8										60	0.27	−0.6										4.8			
Fresno [1]	327	5	34	1,004.4	1,016.6	+1.0	64.7	+4.5	96	15	80	41	4	50	41	82	44	54	.41	−.5	.26	5	7.2	nw.	24	nw.	8	10	13	7	4.4	.0	.0	2
Los Angeles	338	223	250	1,004.1	1,015.9	+.7	62.6	+3.2	91	12	72	44	4	53	30	128	46	61	.04	−1.0	.04	1	6.8	w.	33	nw.	9	11	10	9	4.8	.0	.0	1
San Diego [1]	87	20	55	1,013.2	1,016.6	+1.4	62.7	+3.7	92	13	71	48	10	54	35	102	48	65	.36	−.4	.36	1	7.6	w.	21	w.	3	10	9	11	5.2	.0	.0	0
ALASKA																																		
Anchorage [1]	132	6	44	1,005.4	1,010.5	.....	36.1	+0.7	56	29	46	4	1	26	30	868	24	60	0.33	−0.08	0.18	6	6.0	n.	24	n.	17	8	9	13	5.8	T	0.0	0
Fairbanks [1]	455	5	63	995.3	1,012.9	.....	30.6	+.8	52	24	20	−9	1	20	37	1,028	20	62	0.39	+.09	.25	5	6.7	n.	24	ne.	18	10	7	13	5.6	4.6	0.0	0
Juneau [1]	80	6	30	1,010.8	1,013.9	.....	39.2	−1.0	50	14	45	18	4	34	22	776	33	78	4.33	+1.16	.97	23	8.9	e.	29	se.	12	2	2	26	8.7	4.0	.0	0
Nome	22	10	75	1,012.9	1,013.2	.....	22.8	+3.1	40	21	30	−4	1	15	27	1,269	20	82	0.15	−.32	.12	5	11.6	e.	37	ne.	18	8	9	13	6.0	1.6	32.1	0
Barrow	29	5	27	1,020.0	1,020.7	.....	1.3	+1.0	27	12	9	−26	2	−7	25	1,912	2	98	0.10	−.01	.04	6	9.4	e.	30	ne.	5	11	5	14	5.6	1.3	15.7	0
Bethel	28	5	31	1,007.8	1,009.5	.....	29.2	+2.0	49	27	36	−4	..	22	29	1,069	26	85	0.13	−.39	.06	7	10.2	n.	34	.....	14	8	7	15	6.2	.9	T	0
Cordova	45	5	32	1,008.8	1,010.8	.....	36.8	.....	52	17	45	12	3	29	28	846	30	78	4.30	.....	1.08	15	....	e.	27	se.	29	5	7	18	7.0	.3	.0	0
Gambell	32	5	32	1,012.9	1,013.9	.....	18.2	+0.2	33	16	22	1	10	14	23	1,451	17	92	.10	−.66	.....	4	17.0	ne.	42	ne.	12	3	4	23	8.0	1.0	.0	0
Ketchikan	25	69	90	1,014.9	1,015.6	.....	43.4	+.8	65	16	49	30	3	38	26	649	37	80	13.94	+2.90	3.61	22	7.2	se.	26	e.	11	0	5	26	8.7	.2	.0	0
Kotzebue	20	5	31	1,015.2	1,015.6	.....	14.6	+.8	35	24	23	−15	10	6	26	1,512	12	82	.04	−.23	.....	1	11.4	ne.	31	se.	14	13	4	13	5.0	.4	17.0	0
McGrath	341	5	31	998.6	1,011.5	.....	27.7	+1.7	47	22	39	−20	2	16	45	1,120	21	72	.30	−.12	.15	9	....	n.	..	.....	..	10	6	14	5.8	2.0	1.0	0
Northway	1,718	5	32	948.5	1,012.9	.....	27.6	+1.9	54	25	40	−14	4	16	42	1,123	20	70	.39	+.03	.19	9	5.1	e.	21	e.	24	3	6	21	7.4	2.2	T	0

[1] Data are airport records.
[2] Barometric data (adjusted to old city elevation) and hygrometric data from airport; otherwise city office records.
[3] Observations taken hourly.
[4] Pressure (adjusted to old city elevation), temperature, and hygrometric data from airport; otherwise city office records.
[5] Temperature and precipitation from city records, other data from airport.

NOTE.—Except as indicated by notes [1], [3], [4], and [5] data in table are city office records.

744415—47——2

SEVERE LOCAL STORMS FOR APRIL 1947

[The table hereunder contains such data as have been received concerning severe local storms that occurred during the month. A revised list will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
	April 1947						
Gulfport, Miss., northern and eastern sections.	1	5–6 p. m.			$10,000	High wind and rain.	Trees uprooted; roofs blown off; signs down; highways damaged.
Childress and northeastern Hall County, Tex.	2	7:45 p. m.	12		125,000	Hail	Chief damage to buildings and automobiles; small crop loss.
Gettysburg, Pa.	2	10:15–10:30 p. m.	11			Thunderstorm	Several buildings burned; utility lines out of service. Balls of red fire seen in air and on ground, some appearing to roll through walls of a house. A 4-strand wire fence completely burned away. Trees shattered to splinters and rocks split and thrown in air. Path 1 mile long; damage not estimated.
Climax to Neal, Kans.	4	2:30–5:30 p. m.			10,000	2 hailstorms	In Climax, hailstones were as large as turkey eggs and lemons. Many windows broken and roofs damaged. Path 15 miles long.
Erick, Okla., vicinity of	4	4 p. m.	11		2,500	Wind and hail	Damage to roofs and windows; path 10 miles long.
Covington, Okla.	4	4:30 p. m.	11		5,000	Hail	Damage principally to roofs and windows.
Noble County, Okla., north-central portion.	4	5:30 p. m.	15		2,500	Hail and wind	1 person injured; damage to homes and oil derricks.
Pleasant View and Carnegie, Okla., vicinities of.	4	do		0	1,000	Tornado and hail	Storm covered small area; path narrow.
Haskell, Tex.	4	do		0	2,000	Tornado	Buildings damaged; no crop loss.
Ramona, Okla., vicinity of	4	10 p. m.	880		5,000	Heavy rain and wind.	No details available.
Carnegie to Ft. Cobb, Okla.	4			0	5,000	Tornado	Path 15 miles long, from 2 miles south of Carnegie to 4 miles north of Ft. Cobb; no details available.
Wister, Okla., south of	5	2 a. m.	1100	4	50,750	do	Storm moved northeastward into the vicinity of Poteau, Ark., where 3 persons were injured.
Tennessee	5	Noon				Wind	Roofs damaged; plate glass windows broken.
Moline, Ill.	5	3–12 p. m.		2	100,000	do	Utility lines broken at scattered points, as winds reaching 75 m. p. h. swept across the area for nearly 8 hours Saturday night; service almost fully restored by Monday. Street department expected to be 8–10 days clearing mud and debris in eastern section of city and clearing storm drains, clogged by week's heavy rains. 2 boys drowned when their boat overturned. Winds from west and southwest, 57 m. p. h., broke windows, blew down trees, and damaged planes at Moline Airport, and Cram Field, Davenport, Iowa. Cornice of hotel ripped loose, fell to sidewalk. Woman cut on shoulder by falling glass from hotel.
Cincinnati, Ohio	5					Thunderstorm	2 persons injured; several houses unroofed.
Wisconsin, southeastern counties.	5–6	P. m. of 5th–a. m. of 6th.			5,500	Straight-line wind	Power and transmission lines and poles down; trees blown over; signs down and minor damage to buildings over wide areas; damage not estimated. 3 airplanes wrecked or damaged at Milwaukee: loss, $5,500. Maximum wind at Milwaukee, 60 m. p. h., from southwest at 8:34 p. m., of the 5th.
Minnesota, northern counties.	5–6					Sleet, snow, and winds.	Number of poles and wires down; some damage to trees; roof of old grain elevator in Duluth damaged. Roads blocked by drifts.
Kaufman, Tex.	9	5 p. m.	13		50,000	Hail	Young crops cut down.
White Deer, Glazier, and Higgins, Tex.	9	5:42 p. m.		66	1,505,000	Tornado	Length of path at White Deer, 250 yds.; at Glazier, 600 yds.; at Higgins, 2,640 yds. Along path in Texas, 66 persons killed, 201 injured.
Ellis, Woodward, and Woods Counties, Okla.	9	8–10 p. m.		101	8,022,750	do	Considered worst tornado that ever occurred in Oklahoma. Texas, Oklahoma, and Kansas were in 221-mile path from White Deer, Tex., to St. Leo, Kans. Largest city, Woodward, Okla., suffered major loss of life and property damage. Tornado followed northeasterly path 101 miles in Oklahoma, entering Ellis County about 8 p. m., after demolishing Higgins, Tex. From Ellis County it moved into Woodward County, striking the town of Woodward at 8:43 p. m., destroying much of northwestern half of city. Continued through Woodward and Woods counties, leaving State near Hardtner, Kans., about 10:00 p. m. Storm moved forward about 42 m. p. h. Width of storm, 1.5 miles at Higgins; 1.8 miles at Woodward; 1 mile in Woods County. Red Cross estimates are as follows: Woodward County: 95 killed; 723 injured; 430 homes destroyed, 650 damaged; 925 other buildings destroyed, 775 damaged. Woods County: 0 killed; 17 injured; 25 homes destroyed, 20 damaged; 110 other buildings destroyed, 90 damaged. Ellis County: 6 killed; 42 injured; 52 homes destroyed, 133 damaged; 223 other buildings destroyed, 107 damaged. Property losses, estimated by county agents: Town of Woodward and Woodward County, $6,608,750; Ellis County, $1,264,000; Woods County, $150,000.
Meade and Fowler, Kans., vicinities of.	9	8:15–9:15 p. m.	440	0	225,000	do	No injuries reported. Farm property damaged: path 35 miles long, ending 5 miles south, 12 miles east of Dodge City.
Barber and Kingman Counties, Kans.	9	10–10:30 p. m.	11	0	200,000	do	Continuation of path of tornado that struck Woodward, Okla. Documents from Oklahoma were dropped along storm path in Kansas. Tornado crossed Kansas line at 10 p. m., west of Hardtner, passing through western edge; it passed through Gerlane and northwest edge of Nashville. It seemed to dissipate after doing some damage in St. Leo, 6 miles north of Nashville, at about 11 p. m. Chief damage to farm buildings, livestock, and wire lines. In Gerlane no building escaped without damage. Tornado occurred in connection with a general windstorm in the two counties. Path 40 miles long.
Quinlan, Okla.	9	11 p. m.		0	3,000	do	Number of buildings destroyed; some cattle killed.
Harvey, McPherson, and Marion Counties, Kans., western portions.	10	About 1 a. m.			500,000	Violent winds	Windstorms approaching tornadic violence covered most of Harvey and Marion Counties and eastern portion of McPherson County, near Canton. Great number of commercial buildings damaged in Newton.
Marion and Chase Counties, Kans.	10	1 a. m.	880	0	50,000	Tornado	Path extended from near northern line of Harvey County, passing a short distance north of Peabody and Florence, and ended in Chase County; path 35 miles long.
Harveyville to Auburn, Kans., and vicinities.	10	2:30 a. m.	220	0	25,000	do	Path began 4¼ miles southwest of Harveyville, passing within 600 feet of town. Damage chiefly to barns, sheds, and to cattle killed when a barn collapsed. Last damage occurred about 2 miles east of Auburn.
Antelope to Burdick, Kans., vicinities of.	10	1:30–2 p. m.		0		do	Some damage in Burdick; some farm property damage; much damage to utilities. 2 persons injured; path 20 miles long. Amount of damage not estimated.
Goliad, Tex.	10	8:42 p. m.	15		20,000	Hail	Chief damage to buildings and automobiles; small loss in livestock, poultry, and crops.

See footnote at end of table.

SEVERE LOCAL STORMS FOR APRIL 1947—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
	April 1947						
Laurel Grove, Va., vicinity of.	11	6:50–6:58 p. m.	100	0	10,000	Tornadic winds	Roof torn from one dwelling and windows broken in all but one room; back portion of house twisted away from main portion; concrete foundation cracked; large tree uprooted, and outbuildings completely demolished. A frail structure only a few hundred yards away undamaged. Funnel cloud not observed.
Haskell County, Kans	11		[1] 4		1,500	Heavy hail	Storm extended diagonally across county through Satanta. Chief damage to windows and roofs. Hailstones up to size of eggs, but too early in season for much crop damage.
Sumner County, Ga., extreme northeast.	14	About 9:30 a. m.	50–300	0	60,000	Tornado	Main force of storm in and around Andersonville National Cemetery. Storm came from southwest, lifting soon after reaching Andersonville. Minor to severe damage to about 25 houses. Church demolished and heavy losses to buildings of chemical company. Numerous trees uprooted or blown down; wires down. Crop loss negligible to moderate.
Houston County, Ga., central portion.	14	10:50 a. m	100	0	40,000	do	Possibly same storm that struck Andersonville. Storm came from southwest and struck small area 2 miles south of Perry. Moderate to heavy damage to 8 residences, 5 barns, and numerous small buildings.
Powell Park, Colo	16	P. m.			1,000	Thunderstorm	7 cattle killed by lightning.
Madisonville, La	20	8:15 p. m	300	0	1,700	Tornado	2 homes damaged; barn destroyed; fruit and pecan trees uprooted or tops broken off; commercially grown vegetables and flowers destroyed. Path about 1,000 yards long, with movement of the storm from south to north. Loss in crops, $850; in livestock, $50; damage to buildings, $800.
Pilger, Nebr., and vicinity	23					Wind and heavy hail.	Several sheds blown down or unroofed. Insignificant hail damage, as no crops had been planted.
Madera County, Calif., southwestern portions.	26	5:15–6:15 p. m., P. S. T.			25,000–50,000	Hail and rain	Hail, ¼ to 1 inch in size, knocked leaves off and broke canes on grapevines. Leaves and fruit from trees in orchards, and leaves of alfalfa plants and young cotton and melon plants, taken off; grain shattered. No damage to livestock and buildings.
Wray, Colo., and vicinity	27	6 p. m			100,500	Torrential rain, hail, and flood.	One of worst storms in many years. 6.60 inches of rain recorded. Many persons forced to leave home, and flee from high water which poured off surrounding hills and ran through town. 6–8 inches of hail, as measured on the level, was carried by flood waters and built into banks 5–6 feet deep against obstructions. Holes pounded in roofs; cellars flooded a few inches up to 8 or more feet. Some homes flooded with several feet of water, hail, and debris. Almost no home in Wray escaped entirely from damage. Automobiles parked at curbs were floated up a block, carried over curbs, and slammed against trees. Light service was not affected.
Jewell, Kans	28	Midnight–1 a. m.	[1] 3		1,000	Heavy hail	Occurred 1 mile west of Jewell; no details.
Thomas and Sheridan Counties, Kans.	28	5:15–5:45 p. m.	880	0	40,000	Tornado and heavy hail.	Tornado formed mile east of southeastern portion of Colby, followed U. S. Highway 24 to. about 8 miles, and moved toward northeast, ending about a mile inside Sheridan County. All buildings in path totally or partially destroyed: much damage to telephone lines. 4 persons injured. Path about 18 miles long.
Colby, Kans., 2 miles east	28	5:15–6 p. m	[1] 2	0		Tornado, wind, and hail.	Beginning near eastern city limits, tornado followed U. S. Highway 24, doing considerable damage to property on either side of road. Damage to new radio station site, Kansas-Nebraska Gas Company booster plant, and to a farmhouse. Telephone and electric lines east of Colby flattened in many places. Crop loss not estimated, but seemed considerable in some fields. Some persons slightly injured.
Stapleton, Nebr., vicinity of.	28			0		Thunderstorm, electrical, small tornado, and hail.	Church, struck by lightning, burned. Small tornado and hail in nearby communities, but no report of damage.
Cheyenne to Laramie, Wyo	28					Heavy snow	Highway 30, between Cheyenne and Laramie, blocked by snow. Motorists stranded on Sherman Hill.
Worth, Mo	29			23		Tornado	Worth was main target in 2 tornadic paths: 13 of town's 223 residents killed; 45 injured. 1 funnel destroyed Worth and ripped northeastward into Iowa. The other struck near Rogers, Ark., killing 9 persons, then bounced northeastward toward Rolla, Mo., where one man was killed.
Wagner, Okla., northwest of.	29	8 p. m	880	0	8,000	Tornado and hail	Barn and schoolhouse destroyed.
Southeastern Kaufman County to eastern Van Zandt, Tex.	29	9:10 p. m	200	0	20,000	Tornado	Tornado struck Mabanks, Tex., and moved eastward to the Clower community, injuring 5 persons, and destroying 6 houses and several barns along path.
Washington and Ottawa Counties, Okla.	29–30	Near midnight.			5,000	Wind	1 person injured; no details.
Dillon, S. C., 3 miles east	30	4:30 p. m	900	0	5,000	Tornado	Funnel cloud observed by many. Several buildings damaged, barns destroyed.
Fairmont, N. C	30	4:30–4:40 p. m	150	1	250,000	do	Storm first noticed near Dillon, S. C., near Little Pee Dee River; moved east-northeastawrd to heavily settled rural area south and east of Fairmont. 61 buildings, including 22 dwellings, badly damaged, ½ completely demolished. Loss in growing corn, cotton, and tobacco, estimated at $5,000; loss in stored crops and livestock, $1,500. Property damage, $250,000. Minor damage in vicinity of Dillon, S. C.; and Clarkton, N. C., where sharp wind squall was reported same afternoon, suffered minor damage.
Laurel, Miss., west and south of.	30	5:15 p. m	[1] 10		13,600	High wind and hail	Crop loss, $7,000; property damage, $6,500; tree damage, $100. Storm moved from west to east for 11 miles.
Emmitsburg, Md	30	After 6 p. m				Thunderstorm, heavy rain, and wind.	3 buildings unroofed; 1 roof fell on 2 automobiles, wrecking them.
Rockwall, Tex	30	6:40 p. m	100	0	10,600	Tornado	10 persons injured; 4 homes destroyed; crop damage negligible.
Lake Herington, Kans	30	7:30 p. m	[1] 1½		2,000	Heavy hail	Path 3 miles long.
Baltimore, Md	30	7:42 p. m				Thunderstorm, heavy rain.	Flooding of streets, cellars, and low portions of highway. Fire aboard small trolley, caused by short circuit. 3.64 inches fall of rain recorded in 7 hours.
Columbia, S. C	30	8:15 p. m				Thunderstorm	Comparatively high, gusty winds below down trees, broke branches damaged power lines.
Louisville, Miss	30	9:30–11:30 p. m.			1,200	High wind and hail	Damage mostly from high winds; hail damage slight.

[1] Miles instead of yards.

SOLAR RADIATION AND SUNSPOT DATA FOR APRIL 1947

[Solar Radiation Investigations Section, I. F. HAND in Charge]

Explanations of the tables and references to descriptions of instruments, stations, and methods of observation and to summaries of data, are given in the MONTHLY WEATHER REVIEW, vol. 72, page 43, January 1944. A list of pyrheliometric stations is given on page 45 of the same REVIEW. An explanation of the formula used in computing the air mass values for each station will be found in vol. 75, No. 3, March 1947, p. 47.

SOLAR RADIATION OBSERVATIONS

TABLE 1.—*Solar radiation intensities during April 1947*

[GRAM CALORIES PER MINUTE PER SQUARE CENTIMETER OF NORMAL SURFACE]

Date	Sun's zenith distance: 7:30 a. m.[1]	78.7° A.M.	75.7° A.M.	70.7° A.M.	60.0° A.M.	0.0°	60.0° P.M.	70.7° P.M.	75.7° P.M.	78.7° P.M.	1:30 p. m.[1]
MADISON, WIS.											
Air mass		4.81	3.84	2.88	1.92	0.96*	1.92	2.88	3.84	4.81	e.
	mb.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.
Apr. 3	4.2	0.59	0.77	0.91	1.04	1.38					9.8
Apr. 7	5.1	.54	.68	.95	1.10	1.37					6.9
Apr. 14	6.1		1.05	1.18	1.31	1.45					5.6
Apr. 21	4.8			.64							5.8
Apr. 24	6.1	.68	.84	.98	1.14	1.36					6.9
Apr. 26	6.1	.65	.76	.88	1.08	1.29					7.2
Apr. 28	5.3	.52	.64	.81	1.02	1.26					7.4
Means		.60	.79	.91	1.11	1.35					
Departures		−.10	−.06	−.09	−.07	−.06					
LINCOLN, NEBR.											
Air mass		4.77	3.81	2.86	1.91	0.95*	1.91	2.86	3.81	4.77	e.
	mb.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.
Apr. 14	6.9				1.22	1.41	1.14	0.97	0.88	0.77	9.4
Apr. 16	4.6					1.42	1.22				6.9
Apr. 17	5.6							1.10	1.01	.94	6.9
Apr. 26	7.4				1.16	1.35	.88	.64	.50	.41	8.1
Apr. 28	11.8				.90						13.2
Means					1.09	1.39	1.08	.90	.80	.71	
Departures					−.09	−.06	−.09	−.06	−.02	+.01	
BLUE HILL, MASS.											
Air mass		4.86	3.89	2.92	1.94	0.97*	1.94	2.92	3.89	4.86	e.
	mb.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.
Apr. 3	3.8			1.02	1.19		1.29	1.10	0.97	0.84	3.9
Apr. 4	2.4	0.97	1.07	1.19	1.24						3.5
Apr. 6	13.4						1.03		.68	.59	16.0
Apr. 7	5.1	.69	.84	1.03					.74	.70	4.7
Apr. 8	4.3	.89	.97	1.15	1.27		1.18	.97	.77	.70	3.8
Apr. 10	5.6	.71	.89	1.12	1.24						4.3
Apr. 15	8.4	.65	.77	.94			1.18	1.02	.89	.76	5.5
Apr. 17	7.1	.64	.72	.86	1.09						5.7
Apr. 18	5.4	.72	.82	.94	1.11						4.5
Apr. 19	5.7						1.24	1.09	.97	.84	5.7
Apr. 22	3.8	.87				1.49	1.24	1.06	.92	.79	4.2
Apr. 23	5.8	.57	.69	.87							6.5
Apr. 26	6.7						.84				6.0
Apr. 28	3.5	.94	1.02	1.17	1.29	1.52	1.24	.99	.81	.72	2.5
Apr. 29	4.8	.67	.76	.94							4.8
Means		.76	.86	1.02	1.20	(1.50)	1.20	1.01	.84	.74	
Departures		−.03	−.03	−.01	+.01	+.11	+.07	+.06	+.02	+.06	

See footnotes at end of table.

SOLAR RADIATION OBSERVATIONS—Continued

TABLE 1.—*Solar radiation intensities during April 1947*—Continued

[GRAM CALORIES PER MINUTE PER SQUARE CENTIMETER OF NORMAL SURFACE]

Date	Sun's zenith distance: 7:30 a. m.[1]	78.7° A.M.	75.7° A.M.	70.7° A.M.	60.0° A.M.	0.0°	60.0° P.M.	70.7° P.M.	75.7° P.M.	78.7° P.M.	1:30 p. m.[1]
BOSTON, MASS.											
Air mass		4.96	3.96	2.97	1.98	0.99*	1.98	2.97	3.96	4.96	e.
	mb.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.
Apr. 3	3.7			1.03	1.17						3.8
Apr. 15	8.4		0.60	.82	.92						5.3
Apr. 17	6.9			.87	1.04						5.3
Apr. 18	5.6		.85	.88	1.12						5.3
Apr. 28	2.1		1.01	1.29	1.19	1.50					2.9
Means			.82	.98	1.09	(1.50)					
Departures			+.02	+.02	+.01	+.05					
RATIO, BOSTON/BLUE HILL ON COMPARABLE DATES											
			.94	.99	.97	(.99)					
TABLE MOUNTAIN, CALIF.											
Air mass		3.76	3.01	2.26	1.51	0.75*	1.51	2.26	3.01	3.76	e.
	mb.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.
Apr. 3					1.42						
Apr. 4					1.45						
Apr. 6					1.33						
Apr. 11					1.39						
Apr. 12					1.42						
Apr. 13					1.42						
Apr. 14		1.01	1.11	1.22	1.37	1.53					
Apr. 15					1.38						
Apr. 16					1.36						
Apr. 19					1.39						
Apr. 30					1.32						
Means		(1.01)	(1.11)	(1.22)	1.39	(1.53)					
CLIMAX, COLO.											
Air mass		3.24	2.59	1.94	1.29	0.65*	1.29	1.94	2.59	3.24	e.
	mb.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.
Apr. 1							1.44	1.31			
Apr. 7							1.37	1.10			
Apr. 13							1.42	1.31	1.19		
Apr. 14					1.44	1.58	1.30				
Apr. 16						1.64	1.42	1.26	1.16	1.00	
Apr. 17						1.60	1.34	1.19	1.10	1.03	
Apr. 20						1.60	1.42	1.30			
Apr. 21					1.43	1.58					
Apr. 22					1.36	1.53					
Apr. 23							1.30	1.14	.97	.84	
Means					1.41	1.56	1.38	1.23	1.10	.96	

*Extrapolated.
[1] 75th meridian time.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct+diffuse) received on a horizontal surface*

[Gram calories per square centimeter]

Date	Washington, D.C.	Madison, Wis.	Lincoln, Nebr.	East Lansing, Mich.	New York, N. Y.	Fresno, Calif.	Fairbanks, Alaska	Columbia, Mo.	Boston, Mass.	Nashville, Tenn.	Twin Falls, Idaho	La Jolla, Calif.	Riverside, Calif.	Blue Hill, Mass.	Newport, R. I.	Salt Lake City, Utah	Point-Bay, Ohio	State College, Pa.	Davis, Calif.	Tooele, Utah	New Orleans, La.	Toronto, Canada	Ithaca, N. Y.	Boulder, Colo.	Soda Springs, Calif.	East Wareham, Mass.	Honolulu, Hawaii	Pearl Harbor, Hawaii
1947	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Apr. 2	75	55	320	117	29	467	381	170	28	227	367	305	344	62	49	537	78	90	296	572	517	21	64	407	332	60	624	625
Apr. 3	153	438	67	518	550	426	389	135	541	500	198	554	580	593	566	257	629	539	573	398	333	513	424	291	325	523	485	540
Apr. 4	321	31	114	60	343	605	401	313	449	108	391	566	639	571	556	417	84	258	574	570	386	243	238	551	331	567	639	603
Apr. 5	368	108	54	98	20	592	374	325	17	334	403	517	535	52	35	364	198	257	463	474	517	34	43	604	421	53	534	556
Apr. 6	438	96	540	72	411	597	416	649	316	598	453	530	614	276	167	318	335	560	501	383	222	294	361	469	424	131	443	466
Apr. 7	640	562	262	287	414	589	400	589	439	556	483	556	616	481	525	580	249	81	448	652	441	144	36	462	306	485	529	534
Apr. 8	586	111	166	200	483	605	425	362	508	128	236	529	615	591	584	311	263	521	470	441	397	415	370	498	258	561	641	602
Means	369	200	217	193	321	554	398	363	328	350	361	508	564	375	354	398	265	330	475	498	402	238	219	460	342	340	586	561
Departures	−6	−169	−169	−98	−26	+52	+58	−44	−30	−76	−68	+8	+93	−12	−52	----	−77	−39	−19	+41	−25	−62	−57	+29	----	−40	----	----
Apr. 9	291	477	166	324	51	562	431	372	87	171	500	478	583	189	84	176	526	247	600	434	378	187	158	385	671	85	678	526
Apr. 10	574	128	48	97	494	635	307	23	513	416	447	594	645	612	611	423	196	507	638	595	419	276	368	575	659	584	483	474
Apr. 11	336	83	299	34	468	630	344	252	477	125	595	592	638	564	506	639	178	328	659	606	35	191	207	177	670	532	453	570
Apr. 12	556	510	169	88	369	642	426	260	227	492	583	589	665	263	137	619	380	538	677	671	119	96	299	450	703	117	703	713
Apr. 13	644	593	635	271	543	653	321	572	464	408	579	------	658	531	386	608	187	587	629	664	45	422	175	661	700	548	690	599
Apr. 14	113	600	609	518	170	646	301	651	25	212	583	------	636	85	118	627	504	136	650	661	333	488	174	654	697	95	624	575
Apr. 15	543	87	74	369	557	643	277	65	538	360	592	------	631	616	617	636	543	508	648	700	51	391	424	106	699	572	554	378
Means	436	354	286	243	379	630	344	314	333	312	554	563	637	404	380	532	359	407	643	631	197	293	258	430	686	362	598	540
Departures	+34	−50	−124	−111	+21	+77	−22	−72	−29	−72	+100	+40	+164	+30	−35	----	−26	−5	+61	+146	−221	−63	−46	+4	----	−46	----	----
Apr. 16	153	384	496	282	63	633	307	296	127	379	599	------	616	190	165	649	74	68	588	700	614	64	94	670	674	210	594	641
Apr. 17	238	352	614	432	364	572	331	646	530	487	517	------	597	579	425	357	604	278	616	364	644	500	215	582	595	522	483	680
Apr. 18	646	221	427	287	365	674	369	621	389	624	580	------	430	436	493	344	480	492	674	439	614	474	220	225	707	512	593	434
Apr. 19	638	253	34	430	347	650	460	170	343	602	443	444	515	370	374	600	165	347	642	690	590	590	347	594	682	216	678	508
Apr. 20	577	545	651	191	126	646	493	38	8	147	300	200	396	39	54	538	58	416	577	579	152	213	67	632	632	44	483	520
Apr. 21	67	549	460	520	38	669	360	613	81	123	601	339	407	75	81	130	288	59	641	138	636	647	252	510	309	99	532	492
Apr. 22	480	182	161	171	596	485	282	292	531	481	481	606	478	528	686	133	217	499	687	192	588	378	444	55	737	654	504	462
Means	400	355	419	331	271	618	372	382	287	406	503	412	491	317	326	393	269	308	632	446	548	409	234	468	620	337	553	554
Departures	−15	−50	−22	−44	−114	+34	−6	−14	−74	−32	+21	−94	−16	−69	−87	----	−145	−93	+49	−67	+130	−9	−68	−1	----	−70	----	----
Apr. 23	661	100	125	217	593	679	332	308	526	603	------	543	521	613	376	706	411	587	653	714	596	302	393	108	659	402	359	408
Apr. 24	540	489	287	522	282	651	412	100	399	198	528	437	391	449	355	655	456	135	677	658	595	474	101	122	690	499	621	476
Apr. 25	190	462	552	240	57	475	264	441	127	164	624	380	500	174	142	545	124	56	663	533	465	213	73	520	672	161	547	585
Apr. 26	692	542	681	527	592	669	343	722	378	645	629	541	226	369	307	621	639	619	570	554	234	337	362	699	530	214	570	600
Apr. 27	640	570	632	423	450	654	403	695	411	622	593	286	370	472	511	248	353	212	661	360	561	439	75	208	418	506	633	530
Apr. 28	733	632	289	602	662	645	565	556	631	429	508	421	400	716	705	502	672	693	553	568	417	579	462	573	588	684	572	512
Apr. 29	619	288	312	254	479	677	261	353	393	387	540	421	482	481	532	471	309	514	660	614	441	389	353	694	638	553	489	485
Means	582	440	411	398	445	636	369	453	409	435	585	404	413	468	418	535	423	398	548	572	473	390	260	418	599	431	542	514
Departures	+134	+2	−15	+38	+1	+64	−2	+45	+48	+26	+77	−112	−57	+37	−28	----	+15	−26	−13	+18	+49	−41	−122	−80	----	+14	----	----

ACCUMULATED DEPARTURES ON APRIL 29, 1947

	+3927	−1372	−3612	−532	−497	+1974	----	----	−574	−1200	+2527	−1890	+2765	+168	−1253	----	−1855	+70	−672	+4648	-----	−1204	−2653	+273	----	----	----	----

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR APRIL 1947

By Lucy T. Day

[Equatorial Division, U. S. Naval Observatory]

[Communicated by the Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive towards the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day under Mount Wilson group number, longitude, latitude, area of spot or group, and spot count are included respectively: number of groups, assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count.

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1947	h m		°	°	°	°				
April 1	12 55	8478	−72	83	−24	72	2, 521	16	F	Mt. Wilson.
		8480	−63	92	+15	68	12	1		
		8479	−61	94	−23	63	1, 115	9		
		8476	−31	124	−5	31	36	1		
		8482	−21	134	−25	27	24	1		
		8475	−6	149	−40	35	121	8		
		8473	−1	154	+10	16	48	1		
		8473	+2	157	+12	19	242	12		
		8472	+14	169	−23	22	97	11		
		8472	+21	176	−22	26	291	10		
		8470	+31	186	+20	41	24	1		
		8470	+40	195	+14	46	218	4		
		8477	+40	195	+23	51	48	4		
		8466	+48	203	−10	48	552	2		
		8481	+55	210	+28	65	24	1		
		8463	+64	219	+20	70	218	1		
		(12)		(155)	(−6)		5, 621	83		
2	12 0	8483	−74	68	−13	74	24	1	F	Do.
		8478	−59	83	−24	61	2, 763	10		
		8480	−50	92	+15	56	12	1		
		8478	−48	94	−23	50	921	7		
		8479	−39	103	−8	39	36	1		
		8476	−18	124	−4	18	24	1		
		8482	−7	135	−26	22	145	10		
		8473	+13	155	+14	25	339	15		
		8472	+26	168	−25	31	97	12		
		8472	+34	176	−22	37	339	8		
		8470	+53	195	+15	58	170	1		
		8466	+60	202	−10	60	485	1		
		8463	+78	220	+19	80	145	1		
		(11)		(142)	(−6)		5, 500	69		
3	11 5	8483	−60	69	−14	60	61	1	F	Do.
		8478	−50	79	−25	52	2, 424	9		
		8478	−40	89	−23	43	1, 115	12		
		8480	−37	92	+15	43	12	1		
		8478	−35	94	−23	38	921	6		
		8484	+4	133	−15	10	97	8		
		8482	+6	135	−26	20	170	12		
		8473	+26	155	+14	32	364	10		
		8472	+40	169	−25	43	48	6		
		8472	+48	177	−22	50	242	7		
		8470	+67	196	+15	71	121	1		
		8466	+73	202	−10	73	485	2		
		(9)		(129)	(−6)		6, 060	75		
4	11 10	8483	−46	70	−14	47	61	1	F	Do.
		8478	−37	79	−25	41	2, 763	8		
		8478	−28	88	−23	32	1, 115	13		
		8478	−22	94	−22	27	970	3		
		8484	+18	134	−16	21	339	15		
		8482	+19	135	−26	27	194	6		
		8473	+40	156	+13	45	242	8		
		8472	+61	177	−20	62	218	1		
		(6)		(116)	(−6)		5, 902	55		
5	11 11	8486	−70	33	+16	74	97	1	F	U. S. Naval.
		8485	−53	50	+12	58	109	7		
		8483	−34	69	−13	35	73	3		
		8478	−26	77	−25	32	2, 763	6		
		8478	−15	88	−23	23	1, 018	20		
		8478	−8	95	−23	18	970	2		
		8484	+33	136	−17	35	679	13		
		8482	+34	137	−26	38	109	3		
		8473	+52	155	+13	57	242	3		
		8472	+73	176	−19	73	194	1		
		(8)		(103)	(−6)		6, 254	59		
6	13 16	8489	−60	29	−17	61	24	2	G	Do.
		8486	−60	29	+14	64	24	2		
		8486	−55	34	+14	59	73	2		
		8489	−53	36	−16	53	12	3		
		8485	−40	49	+11	44	12	3		
		8483	−19	70	−13	21	73	5		
		8478	−12	77	−25	22	2, 666	5		
		8478	−1	88	−23	17	970	25		
		8478	+6	95	−23	18	1, 067	5		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR APRIL 1947—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1947	h m		°	°	°	°				
April 6	13 16	8488	+13	102	+26	36	61	2	G	U. S. Naval.
		8487	+33	122	−3	34	24	5		
		8484	+47	136	−17	48	970	15		
		8482	+48	137	−27	52	73	5		
		8473	+66	155	+13	70	145	2		
		8472	+86	175	−20	86	97	1		
		(11)		(89)	(−6)		6, 291	82		
7	11 52	8489	−44	32	−14	45	48	2	VG	Do.
		8486	−42	34	+14	47	73	3		
		8485	−26	50	+11	31	12	2		
		8492	−17	59	+18	30	6	1		
		8483	−7	69	−13	11	61	1		
		8478	+1	77	−25	20	2, 618	15		
		8478	+12	88	−23	21	921	30		
		8478	+18	94	−23	24	1, 067	5		
		8490	+18	94	−5	18	48	3		
		8488	+28	104	+25	43	48	4		
		8491	+32	108	−13	32	12	5		
		8487	+47	123	−3	48	97	6		
		8482	+58	134	−27	61	73	2		
		8484	+60	136	−17	60	1, 018	15		
		8482	+65	141	−27	67	12	2		
		8473	+79	155	+13	80	121	1		
		(13)		(76)	(−6)		6, 235	97		
8	10 48	8489	−32	32	−15	33	48	6	F	Do.
		8486	−25	35	+15	36	61	1		
		8492	−1	63	+19	27	6	1		
		8483	+6	70	−13	9	61	2		
		8478	+14	78	−25	23	2, 618	5		
		8478	+22	86	−23	27	582	17		
		8478	+31	95	−23	34	1, 067	2		
		8490	+31	95	−5	31	121	4		
		8488	+40	104	+26	52	48	5		
		8491	+44	108	−13	45	12	2		
		8487	+60	124	−3	60	145	6		
		8484	+72	136	−17	72	970	5		
		(10)		(64)	(−6)		5, 739	56		
9	11 1	8496	−88	322	−17	88	97	1	VG	Do.
		8495	−35	15	+11	39	12	1		
		8489	−20	30	−15	22	109	6		
		8486	−16	34	+15	27	61	1		
		(*)	+3	53	+11	17	12	6		
		8483	+21	71	−14	22	48	1		
		8478	+25	75	−25	30	2, 909	8		
		8478	+37	87	−23	41	727	30		
		8493	+40	90	+17	47	24	2		
		8478	+44	94	−23	45	1, 067	2		
		8490	+45	95	−5	45	230	2		
		8488	+55	105	+25	65	24	3		
		8487	+72	122	−3	72	194	2		
		8484	+85	135	−17	85	824	4		
		(12)		(60)	(−6)		6, 338	69		
10	11 42	8496	−73	324	−16	73	48	2	F	Do.
		8495	−21	16	+11	27	48	6		
		8489	−7	30	−15	12	97	18		
		8486	−3	34	+15	22	61	1		
		8494	+18	55	+11	25	61	2		
		8483	+34	71	−14	35	24	1		
		8478	+39	76	−25	42	3, 006	7		
		8478	+51	88	−23	53	970	16		
		8493	+54	91	+17	60	48	2		
		8490	+57	94	−5	57	61	3		
		8478	+58	95	−23	60	921	1		
		8490	+62	99	−8	62	145	1		
		8488	+70	107	+25	78	12	1		
		8491	+77	114	−12	77	48	1		
		(11)		(37)	(−6)		5, 550	62		
11	10 31	8496	−60	324	−16	61	97	2	G	Do.
		8497	−41	343	+15	46	24	1		
		8495	−8	16	+11	19	24	4		
		8489	+7	31	−15	12	121	13		
		8486	+10	34	+15	23	48	1		
		8494	+30	54	+11	35	24	4		
		8483	+46	70	−14	47	24	1		
		8478	+51	75	−25	53	3, 006	12		
		8478	+63	87	−24	65	727	10		
		8490	+69	93	−5	69	36	1		
		8478	+70	94	−24	70	824	1		
		8490	+75	99	−8	75	121	1		
		(9)		(24)	(−6)		5, 076	51		
12	10 46	8496	−47	324	−16	47	121	3	G	Do.
		8495	+8	19	+10	18	12	1		
		8489	+21	32	−16	24	109	13		
		8486	+23	34	+15	32	48	1		
		8494	+45	56	+11	49	24	2		

See footnotes at end of table.

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR APRIL 1947—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1947	h m		°	°	°	°				
April 12	10 37	8483	+60	71	−18	60	24	1	G	U. S. Naval.
		8483	+60	71	−18	61	24	1		
		8478	+65	76	−25	67	2,957	11		
		8478	+76	87	−25	76	727	8		
		8478	+85	96	−24	85	824	1		
		(7)		(11)	(−6)		4,870	42		
13	10 33	8498	−64	294	+23	71	12	1	F	Do.
		8496	−43	315	−15	44	12	1		
		8496	−33	325	−17	34	109	3		
		8499	−15	343	−9	16	24	2		
		8495	+23	21	+10	27	24	1		
		8489	+35	33	−16	37	97	6		
		8486	+37	35	+15	43	48	1		
		8494	+57	55	+11	61	145	3		
		8478	+78	76	−25	78	2,909	2		
		(8)		(358)	(−6)		3,380	20		
14	11 11	8500	−65	279	−18	66	73	10	F	Mt. Wilson.
		8498	−49	295	+22	57	12	1		
		8496	−30	314	−16	32	24	7		
		8496	−20	324	−16	23	145	14		
		8499	−2	342	−9	3	36	4		
		8495	+37	21	+10	41	24	1		
		8489	+47	31	−16	48	48	5		
		8486	+51	35	+15	56	48	1		
		8494	+70	54	+12	74	121	4		
		(8)		(344)	(−6)		531	47		
15	10 37	8501	−67	264	+19	71	48	2	F	U. S. Naval.
		8500	−52	279	−18	53	61	4		
		8496	−17	314	−17	21	24	5		
		8502	−9	322	+23	31	73	3		
		8496	−8	323	−17	14	97	7		
		8486	+63	34	+15	68	48	2		
		(5)		(331)	(−6)		351	23		
16	15 55	8501	−53	262	+22	60	48	4	F	Do.
		8501	−50	265	+20	57	73	3		
		8500	−39	276	−18	40	194	8		
		8496	+4	319	−17	13	36	2		
		8496	+10	325	−17	15	61	2		
		8503	+41	356	−12	41	12	1		
		(4)		(315)	(−6)		424	20		
17	11 11	8501	−43	262	+21	51	48	9	VG	Mt. Wilson.
		8501	−38	267	+19	45	73	10		
		8500	−32	273	−20	33	194	10		
		8500	−27	278	−19	30	194	21		
		8496	+23	328	−17	25	97	9		
		8499	+43	348	−12	43	48	7		
		8503	+53	358	−13	53	24	5		
		(5)		(305)	(−5)		678	71		
18	11 6	8506	−80	211	+21	80	48	1	F	U. S. Naval.
		8505	−42	249	+12	46	24	2		
		8501	−30	261	+22	40	24	1		
		8501	−26	265	+18	35	48	5		
		8500	−20	271	−19	24	242	4		
		8500	−13	278	−18	19	194	11		
		8496	+33	324	−17	35	48	2		
		8504	+53	344	−21	54	24	2		
		8499	+56	347	−11	57	24	3		
		(7)		(291)	(−5)		676	31		
19	10 28	8508	−88	191	+24	88	48	1	F	Do.
		8507	−76	203	−11	77	48	1		
		8506	−66	213	+20	70	48	1		
		8505	−29	250	+11	33	48	8		
		8501	−17	262	+22	32	24	9		
		8501	−14	265	+17	27	24	3		
		8500	−7	272	−19	15	242	7		
		(*)	−4	275	−26	22	24	5		
		8500	−2	277	−18	13	97	8		
		8500	0	279	−18	13	145	7		
		8496	+46	325	−16	48	24	5		
		8499	+63	342	−11	63	73	1		
		8504	+67	346	−20	67	12	1		
		8499	+67	346	−10	67	24	5		
		(10)		(279)	(−5)		881	62		
20	12 9	8509	−76	188	−24	77	12	1	F	Mt. Wilson.
		8508	−68	196	+23	71	194	1		
		8507	−63	201	−12	63	48	1		
		8506	−50	214	+21	55	48	1		
		8501	−3	261	+16	20	48	6		
		8500	+11	275	−21	20	218	9		
		8499	+80	344	−12	80	97	1		
		8504	+81	345	−20	81	48	1		
		(8)		(264)	(−5)		713	21		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR APRIL 1947—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1947	h m		°	°	°	°				
April 22	11 48	8512	−82	156	−11	82	145	1	F	U. S. Naval.
		8512	−75	163	−9	75	291	1		
		8511	−65	173	−20	65	61	1		
		8508	−40	198	+24	43	73	1		
		8506	−26	212	+22	27	97	2		
		8501	+26	264	+15	33	24	2		
		8501	+31	269	+15	36	24	1		
		8500	+33	271	−21	36	121	4		
		8500	+41	279	−19	42	97	1		
		(6)		(238)	(−5)		933	14		
23	10 36	8513	−78	148	−17	79	291	5	F	Do.
		8512	−69	157	−11	69	242	2		
		8512	−63	165	−10	63	436	2		
		8511	−52	174	−21	54	73	1		
		8510	−45	181	+25	53	48	1		
		8508	−28	198	+24	41	73	1		
		8507	−23	203	−11	24	6	1		
		8506	−13	213	+22	30	97	3		
		8505	+26	252	+11	31	73	2		
		8501	+39	265	+13	42	145	6		
		8500	+45	271	−21	47	73	2		
		8500	+53	279	−19	55	121	1		
		(10)		(226)	(−5)		1,678	27		
24	11 2	8516	−69	143	−17	69	291	6	F	Do.
		8513	−58	154	−18	59	218	1		
		8512	−56	156	−11	57	218	1		
		8512	−50	162	−10	51	485	2		
		8511	−40	172	−21	42	49	1		
		8510	−33	179	+24	44	194	11		
		8515	−27	185	+18	35	6	1		
		8508	−16	196	+22	31	48	1		
		8506	+1	213	+22	26	61	4		
		8514	+40	252	+12	44	194	11		
		8505	+40	252	+9	43	121	10		
		8501	+51	263	+12	52	24	3		
		8500	+67	279	−18	67	121	1		
		(12)		(212)	(−5)		2,029	55		
25	13 22	8522	−80	118	−10	80	194	1	F	Do.
		8522	−77	121	−13	77	24	1		
		8518	−69	129	−6	69	242	3		
		8517	−65	133	+33	72	97	4		
		8516	−55	143	−17	57	242	17		
		8513	−48	150	−17	50	339	4		
		8512	−41	157	−10	41	218	5		
		8512	−33	165	−10	34	485	2		
		8511	−27	171	−22	32	24	1		
		8521	−20	178	+11	27	291	12		
		8510	−16	182	+23	32	364	10		
		8508	−1	197	+23	28	48	1		
		8520	−1	197	+18	23	12	1		
		8506	+12	210	+17	25	36	2		
		8506	+15	213	+21	30	73	4		
		8514	+51	249	+13	54	145	3		
		8505	+53	251	+10	56	291	4		
		8514	+57	255	+11	60	121	3		
		8519	+60	258	−12	60	48	2		
		8500	+80	278	−19	80	97	1		
		(16)		(198)	(−5)		3,391	81		
26	10 47	8522	−68	118	−10	68	145	1	G	Do.
		8518	−57	129	−7	57	97	3		
		8517	−51	135	+32	60	48	2		
		8516	−45	141	−16	47	339	11		
		8516	−40	146	−15	42	97	8		
		8513	−39	147	−15	41	97	2		
		8513	−34	152	−17	36	194	1		
		8512	−31	155	−10	32	145	2		
		8512	−23	163	−9	24	388	4		
		8511	−17	169	−20	23	48	2		
		8521	−10	176	+11	19	97	6		
		8510	−7	179	+25	20	218	8		
		8521	−5	181	+11	17	242	3		
		8510	−3	183	+24	20	48	16		
		8515	0	186	+18	23	24	3		
		8510	+2	188	+24	29	194	3		
		8508	+11	197	+23	30	48	1		
		8506	+28	214	+21	38	97	4		
		8514	+64	250	+13	66	145	2		
		8505	+67	253	+11	69	436	12		
		8523	+69	255	−22	70	48	1		
		(15)		(186)	(−5)		3,195	95		
27	10 26	8527	−88	85	−23	88	97	1	F	Do.
		8526	−77	96	−23	77	97	1		
		8525	−69	104	+21	72	12	1		
		8522	−55	118	−10	56	194	1		
		8518	−42	131	−6	42	145	3		
		8517	−37	136	+33	52	24	1		
		8516	−31	142	−16	33	194	7		
		8516	−25	148	−16	27	145	1		

See footnotes at end of table.

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR APRIL 1947—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1947 April 27	h m 10 26	8513	−19	154	−16	22	170	1	F	U. S. Naval.
		8512	−17	156	−10	18	145	3		
		8512	−9	164	−9	10	339	4		
		8511	−1	172	−21	16	48	1		
		8521	+2	175	+12	16	97	5		
		8510	+7	180	+25	31	121	6		
		8521	+9	182	+11	18	291	1		
		8515	+13	186	+19	27	48	3		
		8510	+16	189	+24	33	436	7		
		8508	+24	197	+24	38	48	1		
		8514	+77	250	+13	79	242	1		
		8505	+80	253	+11	80	145	2		
		(16)		(173)	(−5)		3,038	51		
28	13 13	8527	−88	70	−23	88	97	1	G	Do.
		8527	−70	88	−22	71	97	1		
		8526	−62	96	−23	63	73	1		
		8525	−51	107	+21	56	12	1		
		8522	−41	117	−10	42	194	1		
		8518	−27	131	−9	28	97	3		
		8516	−25	133	−15	26	73	2		
		8516	−18	140	−19	23	291	10		
		8513	−7	151	−17	16	242	4		
		8512	−1	157	−11	7	145	9		
		8512	+7	165	−10	10	388	2		
		8521	+17	175	+12	23	145	5		
		8510	+20	178	+25	34	73	2		
		8521	+23	181	+11	27	291	1		
		8515	+29	187	+18	36	145	5		
		8510	+30	188	+23	40	485	7		
		8508	+39	197	+23	47	48	1		
		(12)		(188)	(−4)		2,896	56		
29	10 28	8527	−78	68	−25	79	970	7	F	Do.
		8527	−59	87	−24	60	194	2		
		8526	−49	97	−24	51	73	2		
		8525	−41	105	+20	47	73	2		
		8522	−28	118	−10	29	194	1		
		8518	−16	130	−9	17	48	2		
		8516	−15	131	−14	19	145	4		
		8516	−5	141	−17	14	73	2		
		8516	+1	147	−16	12	97	3		
		8513	+2	148	−16	12	48	1		
		8513	+8	154	−17	16	194	1		
		8512	+12	158	−11	13	97	1		
		8512	+18	164	−10	20	388	3		
		8521	+29	175	+12	32	97	7		
		8510	+32	178	+25	43	97	2		
		8521	+35	181	+11	37	315	1		
		8528	+41	187	−10	41	24	3		
		8510	+42	188	+24	50	727	8		
		8515	+43	189	+18	48	194	5		
		8506	+68	214	+23	70	24	2		
		(13)		(146)	(−4)		4,072	57		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR APRIL 1947—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1947 April 30	h m 10 23	8527	−66	67	−24	67	1,212	12	F	U. S. Naval.
		8527	−46	87	−24	48	170	3		
		8527	−43	90	−19	46	24	3		
		8526	−37	96	−24	41	48	1		
		8525	−29	104	+22	38	194	10		
		8532	−27	106	−25	33	12	2		
		8531	−21	112	−21	27	97	12		
		8522	−15	118	−10	18	194	1		
		8530	−7	126	−17	15	48	2		
		8530	−3	130	−14	12	61	10		
		8516	+15	148	−17	20	61	8		
		8513	+21	154	−18	25	194	2		
		8512	+23	156	−11	24	48	6		
		8512	+31	164	−11	32	291	2		
		8521	+46	179	+11	47	267	5		
		8510	+46	179	+25	53	24	2		
		8510	+56	189	+24	60	727	7		
		8515	+57	190	+18	60	194	8		
		(13)		(133)	(−4)		3,866	96		

Mean daily area for 29 days = 3,523
Mean 10 g+s for 29 days = 155.1

* Not numbered.
VG = very good; G = good; F = fair; P = poor.

PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR APRIL 1947

[Dependent on observations at Zurich Observatory and its stations at Locarno and Arosa.]

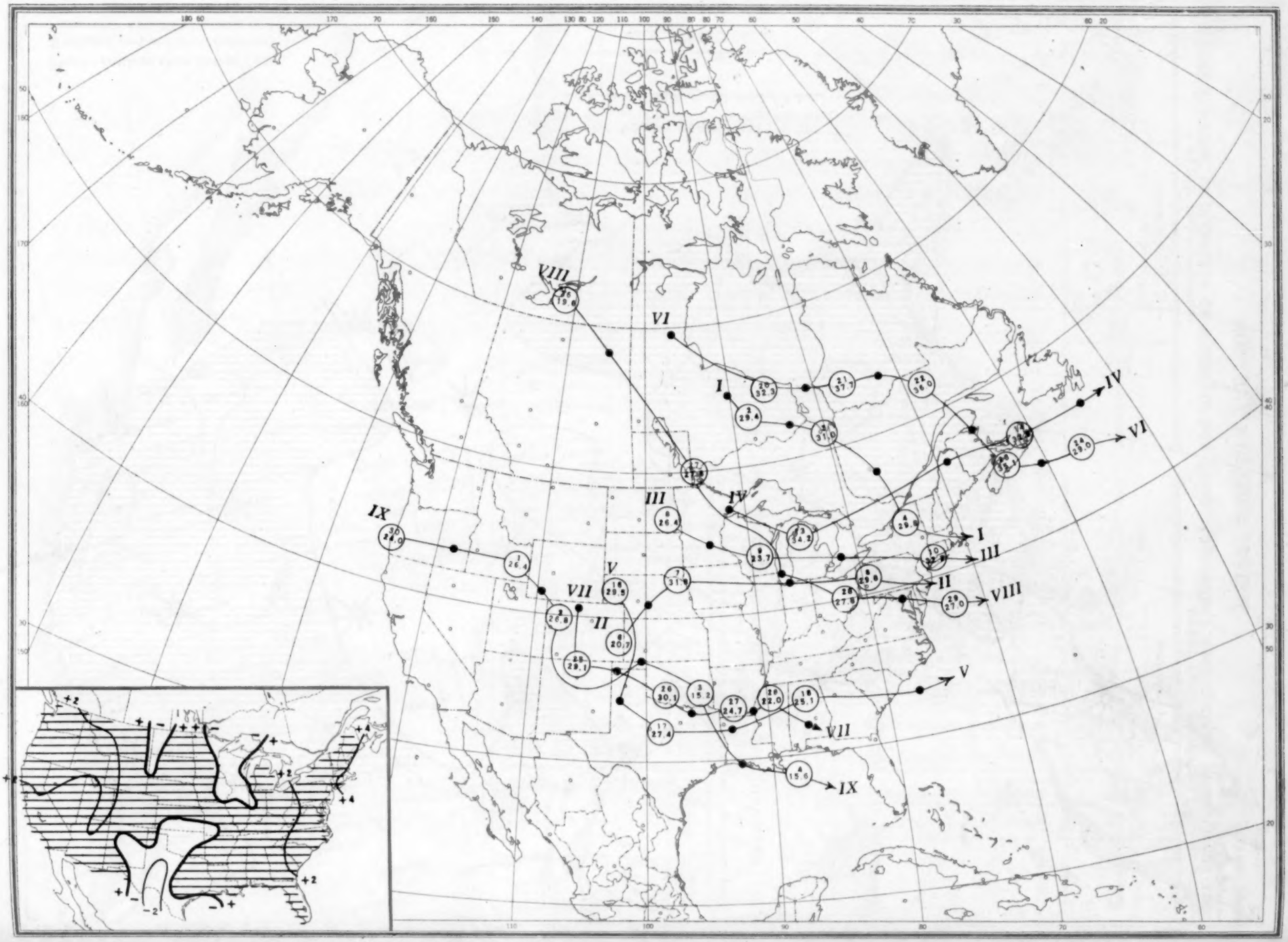
April 1947	Relative numbers	April 1947	Relative numbers	April 1947	Relative numbers
1	168	11	143	21	87
2	170	12	120	22	77
3	198	13	97	23	91
4	196	14	109	24	103
5	182	15	100	25	222
6	212	16	75	26	198
7	228	17	78	27	191
8	216	18	85	28	216
9	182	19	87	29	214
10	171	20	95	30	185

Mean 30 days = 149.9

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, April 1947

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, April 1947

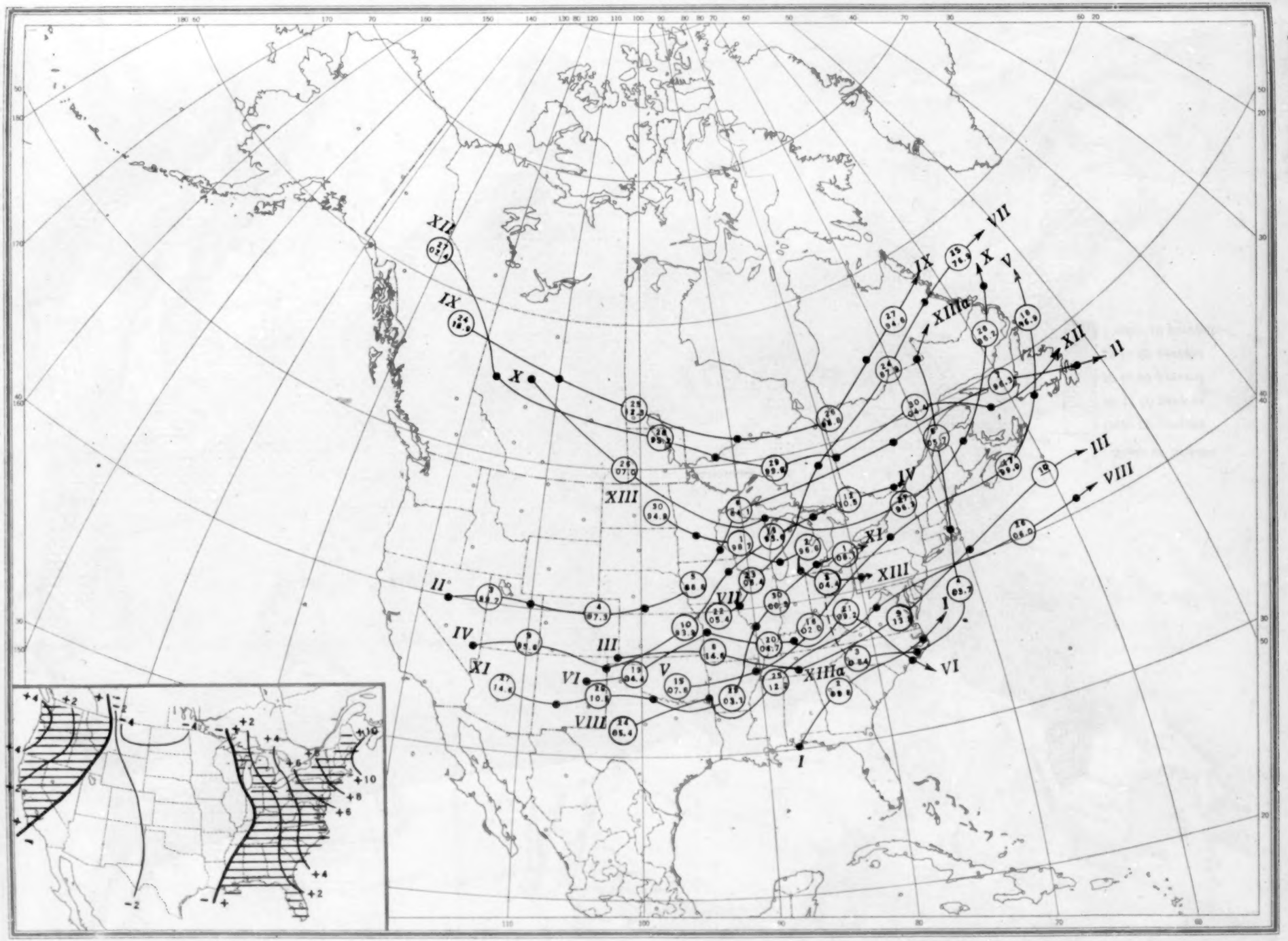
Chart II. Tracks of Centers of Anticyclones, April 1947. (Inset) March Departure of Monthly Mean Pressure from Normal



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time)

Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time)

Chart III. Tracks of Centers of Cyclones, April 1947. (Inset) Change in Mean Pressure from Preceding Month



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time)

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, April 1947

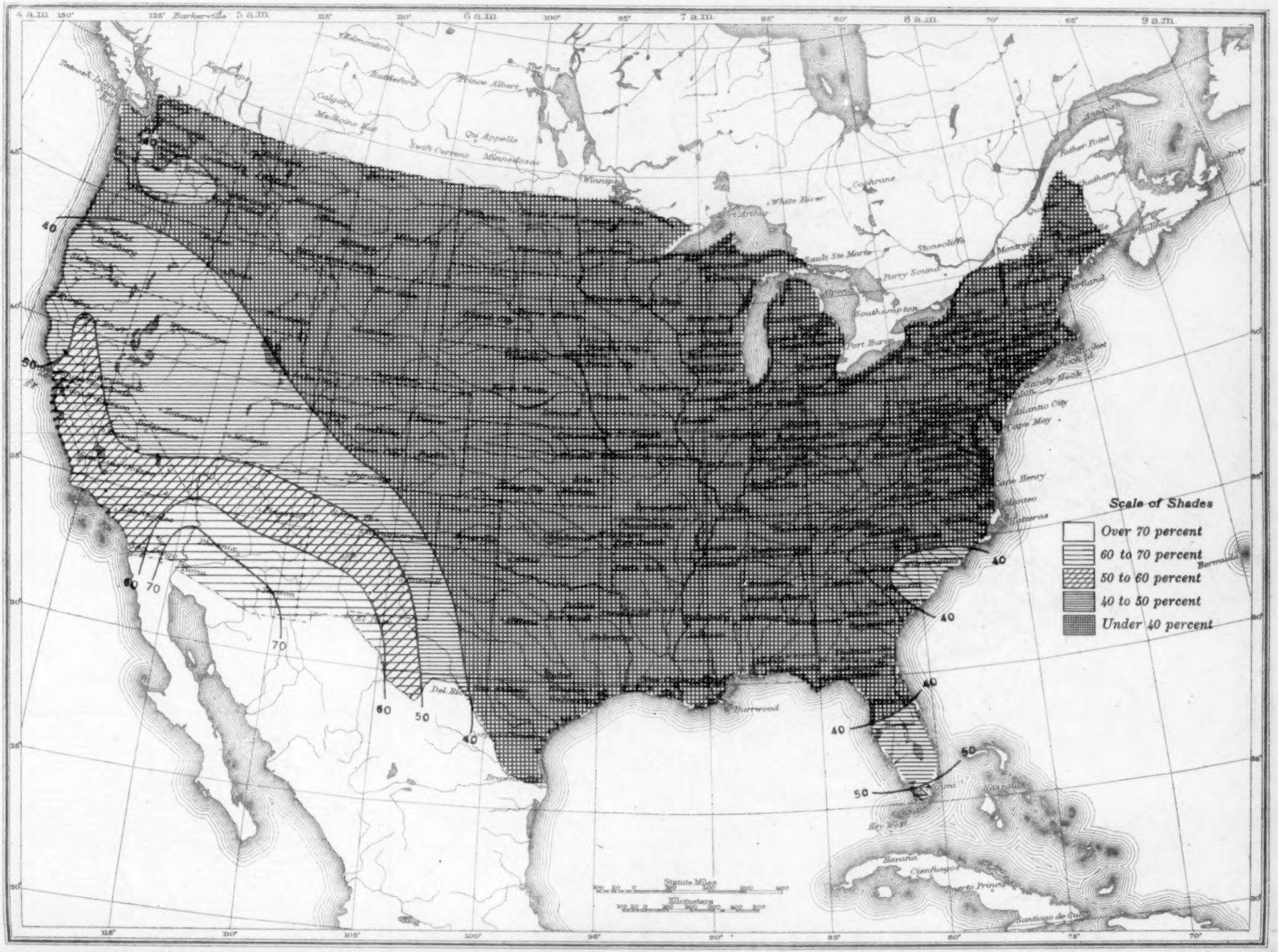


Chart V. Total Precipitation, Inches, April 1947. (Inset) Departure of Precipitation from Normal

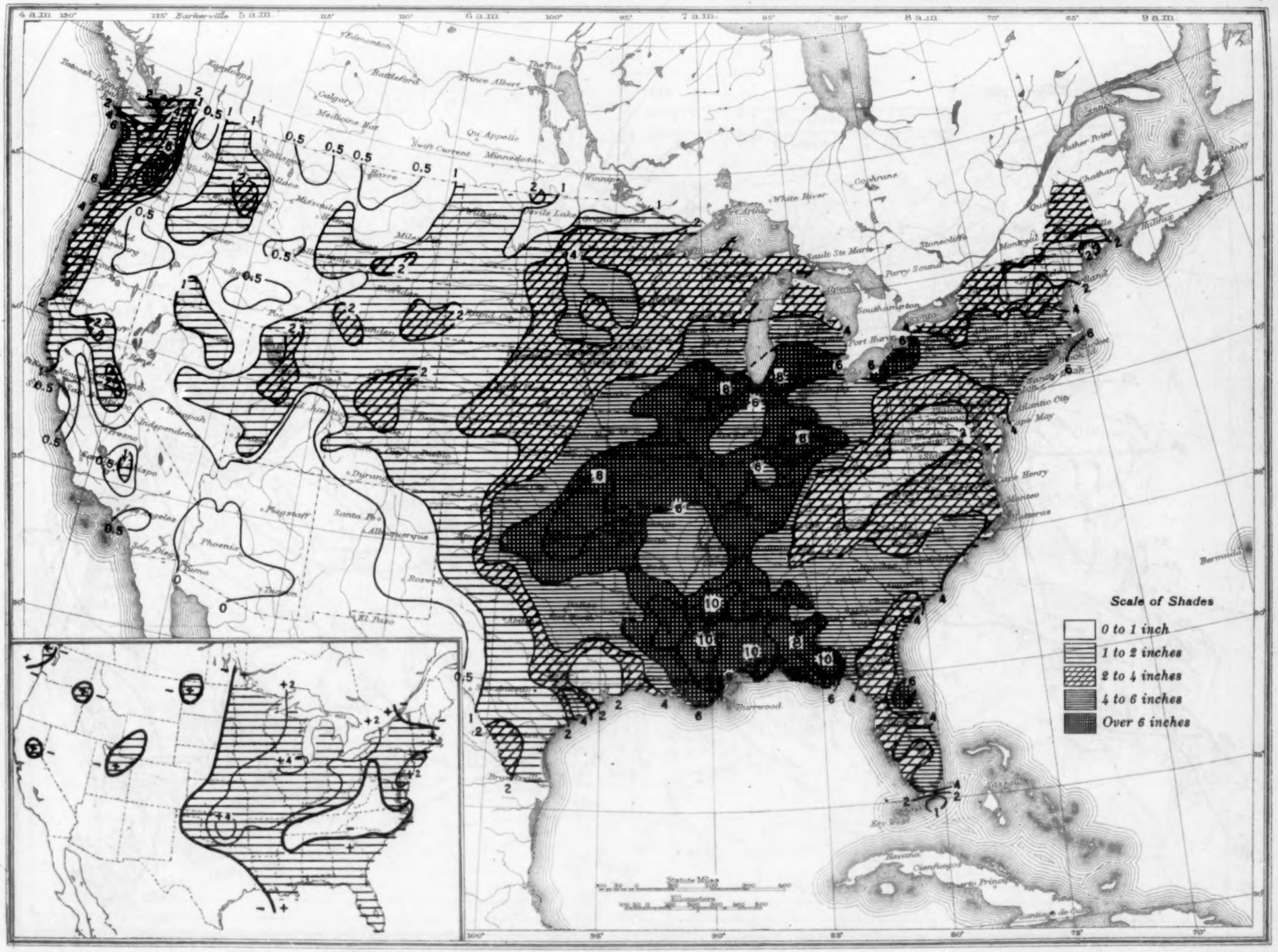


Chart VI. Isobars (mb.), at Sea Level and Isotherms (°F.) at Surface; Prevailing Winds, April 1947

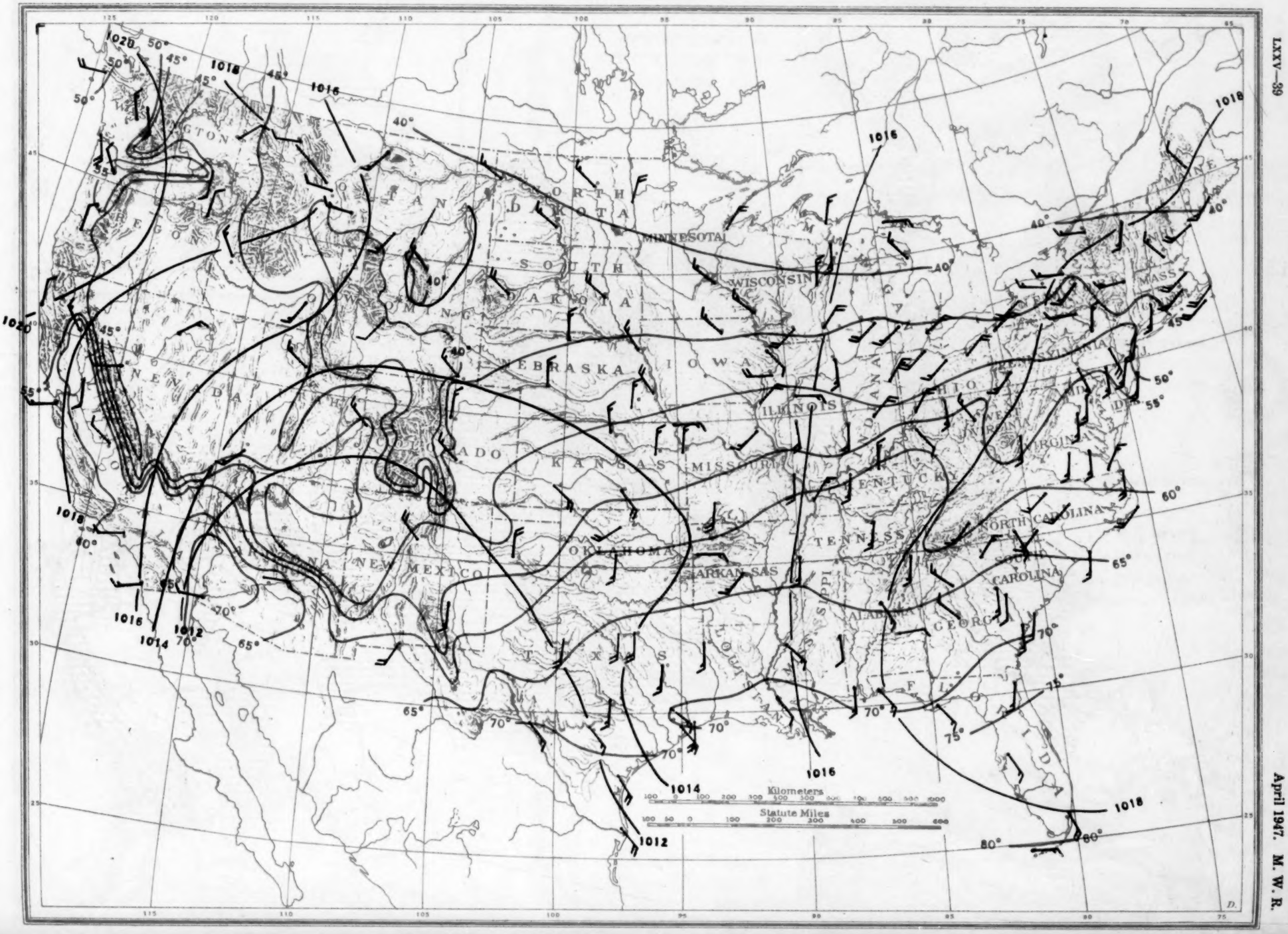
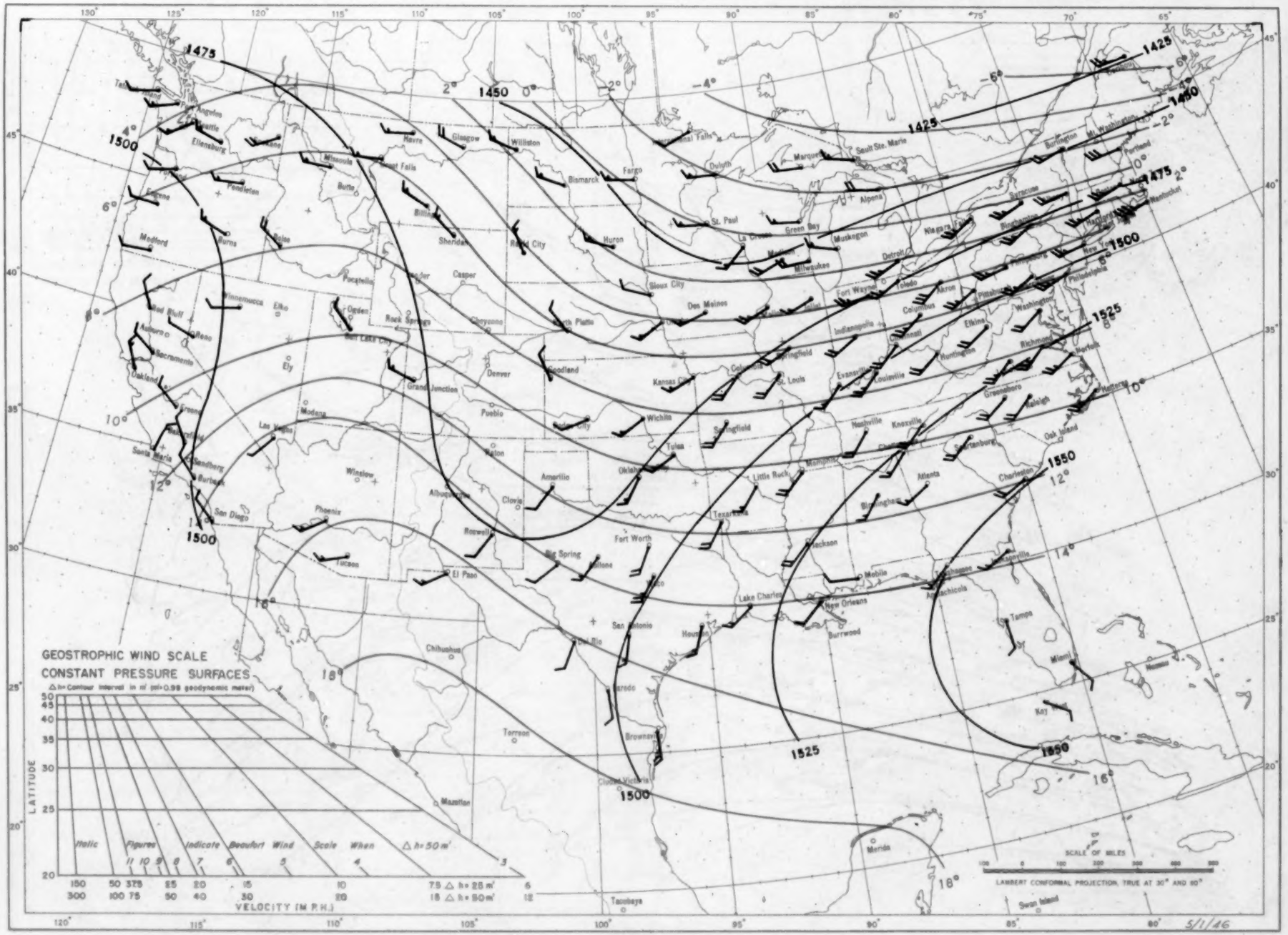
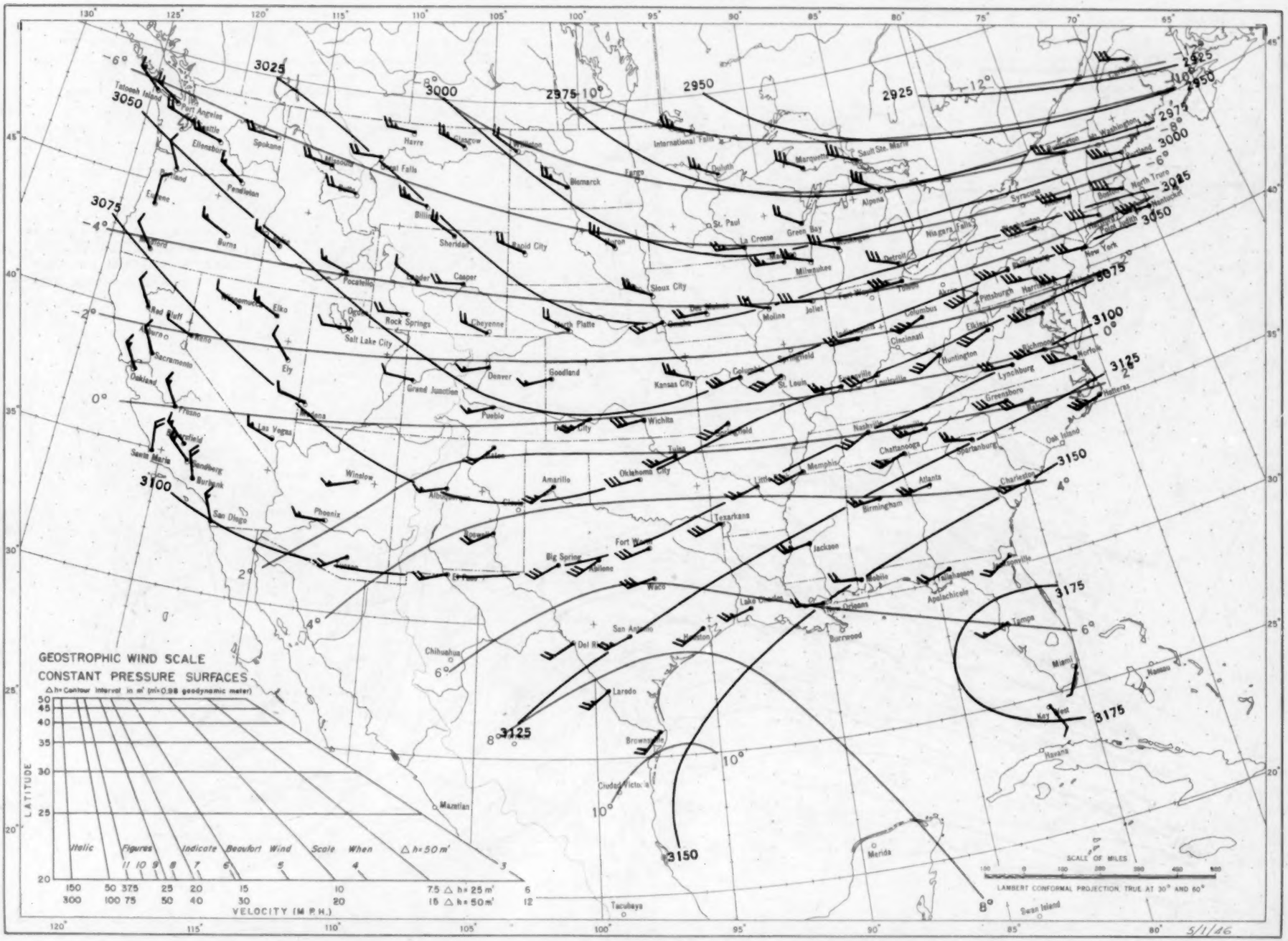


Chart VIII, April 1947. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 850-millibar Pressure Surface, and Resultant Winds at 1,500 Meters (m.s.l.)


GEOSTROPHIC WIND SCALE
CONSTANT PRESSURE SURFACES
△h= Contour interval in m/ sec²=0.98 geodynamic meter)
LATITUDE
VELOCITY (M.P.H.)
Italic Figures Indicate Beaufort Wind Scale When △h=50m²
SCALE OF MILES
LAMBERT CONFORMAL PROJECTION, TRUE AT 30° AND 60°
5/1/46

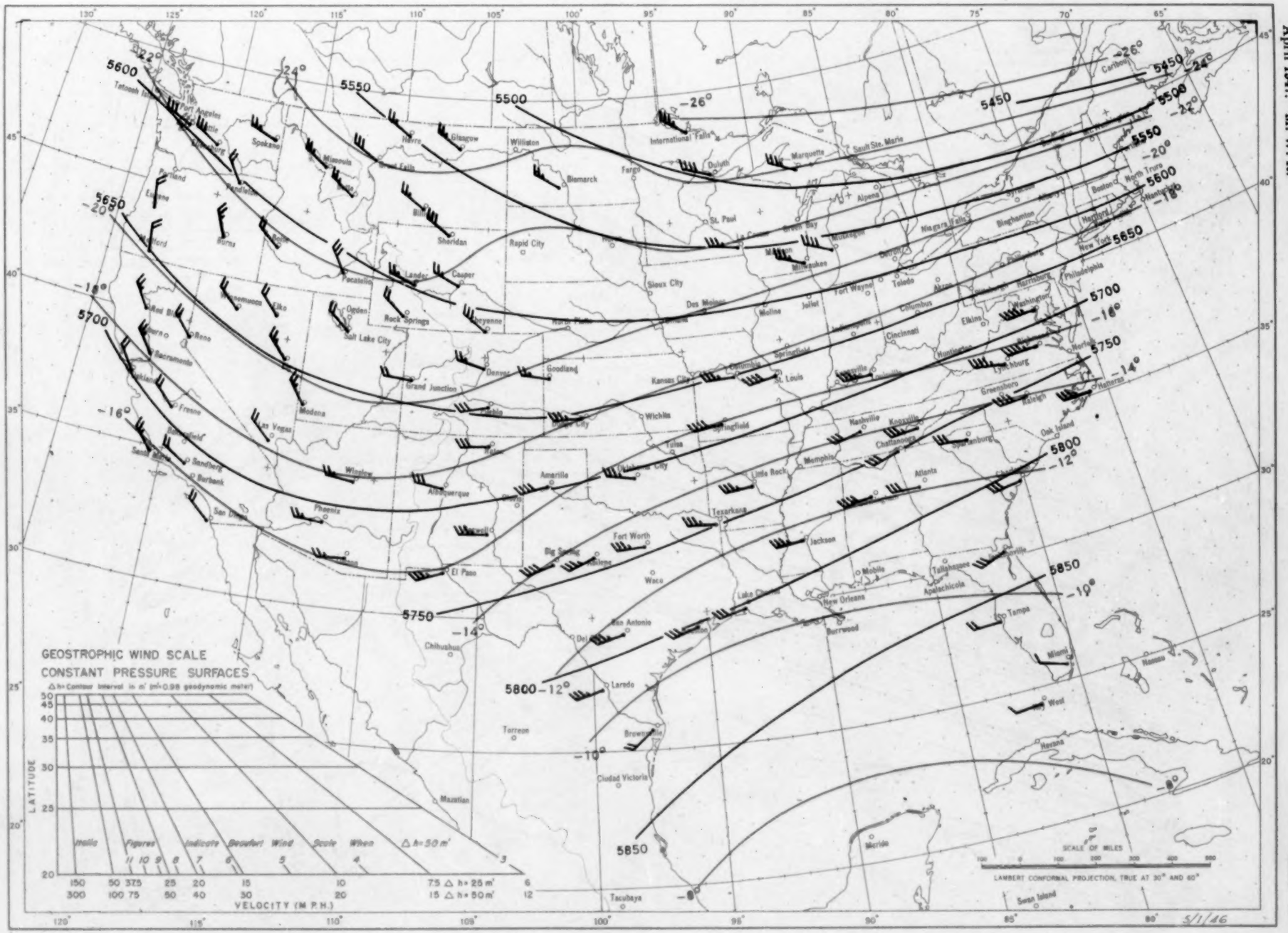
Contour lines and isotherms based on radiosonde observations at 0300 G.C.T., and winds based on pilot balloon observations at 2200 G.C.T.

Chart IX, April 1947. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 700–millibar Pressure Surface, and Resultant Winds at 3,000 Meters (m.s.l.)


GEOSTROPHIC WIND SCALE
CONSTANT PRESSURE SURFACES
Δh= Contour interval in m' (m'=0.98 geodynamic meter)
LATITUDE
VELOCITY (M.P.H.)
Italic Figures indicate Beaufort Wind Scale When Δh=50 m'
150 50 375 25 20 15 10 7.5 Δh=25 m' 6
300 100 75 50 40 30 20 15 Δh=50 m' 12
SCALE OF MILES
LAMBERT CONFORMAL PROJECTION, TRUE AT 30° AND 60°
5/1/46

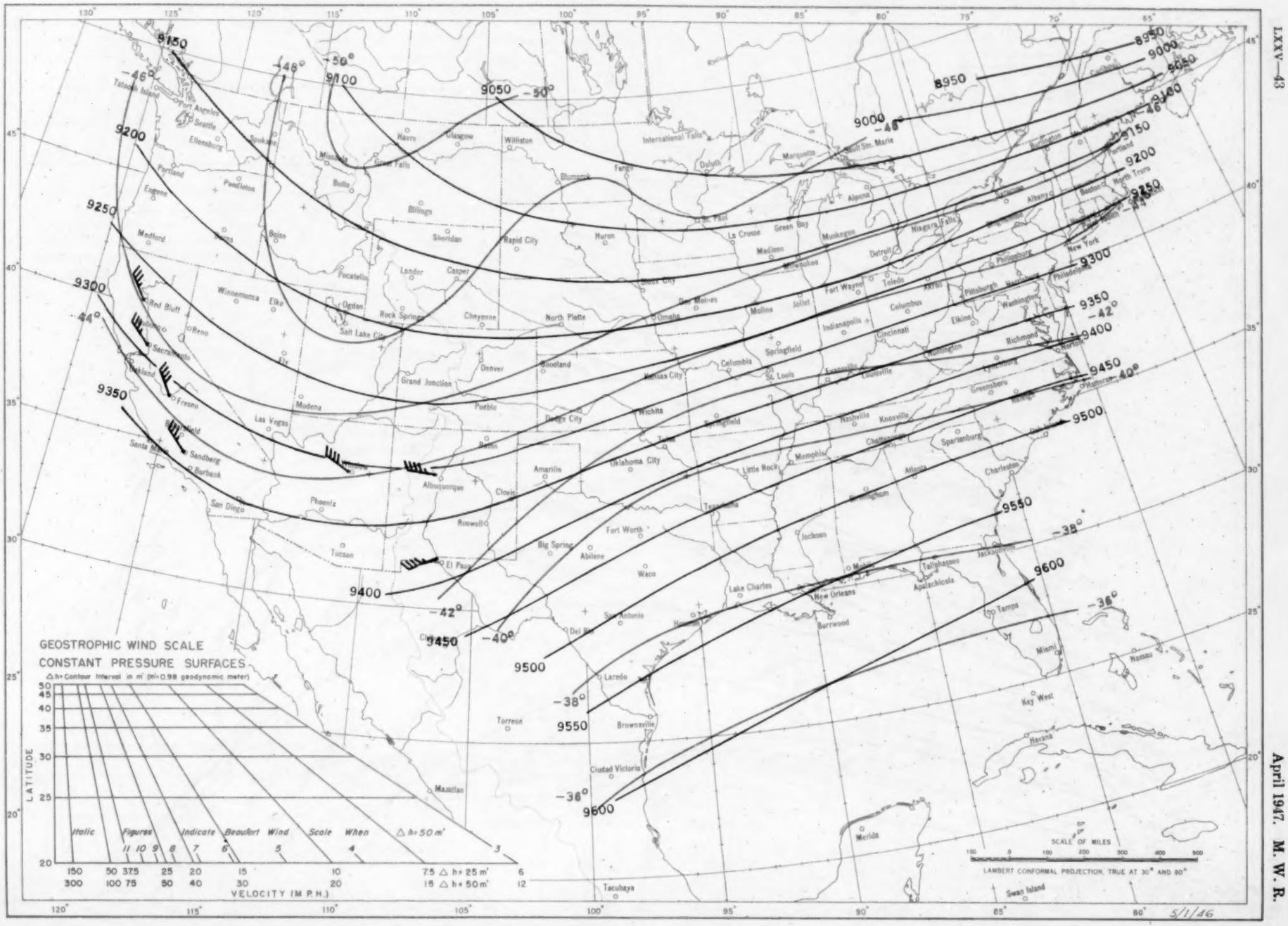
Contour lines and isotherms based on radiosonde observations at 0300 G.C.T., and winds based on pilot balloon observations at 2200 G.C.T.

Chart X, April 1947. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 500–millibar Pressure Surface, and Resultant Winds at 5,000 Meters (m.s.l.)



Contour lines and isotherms based on radiosonde observations at 0300 G.C.T., and winds based on pilot balloon observations at 2200 G.C.T.

Chart XI, April 1947. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 300–millibar Pressure Surface, and Resultant Winds at 10,000 Meters (m.s.l.)


GEOSTROPHIC WIND SCALE
CONSTANT PRESSURE SURFACES
△h= Contour Interval in m' (m'=0.98 geodynamic meter)
LATITUDE
VELOCITY (M.P.H.)
Italic Figures Indicate Beaufort Wind Scale When △h=50 m'
11 10 9 8 7 6 5 4 3
150 50 375 25 20 15 10 75 △h=25 m' 6
300 100 75 50 40 30 20 15 △h=50 m' 12
SCALE OF MILES
LAMBERT CONFORMAL PROJECTION, TRUE AT 30° AND 80°
5/1/46

Contour lines and isotherms based on radiosonde observations at 0300 G.C.T., and winds based on pilot balloon observations at 2200 G.C.T.